

Implementing Microsoft SharePoint 2019

An expert guide to SharePoint Server for architects, administrators, and developers

Lewin Wanzer | Angel Wood



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administrators, and developers

Lewin Wanzer

Angel Wood



BIRMINGHAM—MUMBAI

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To God, for giving me the opportunity to help others, to my mother, Janie Wanzer, and to the memory of my father, Clayton, for their sacrifices and for instilling the values of courage and perseverance. To my wife, Elsi, for being my loving partner, along with all my kids, old and young, who supported me through this effort.

– Lewin Wanzer

I would like to thank God for the goodness he has shown to me and my family. I am grateful to have this opportunity to share this knowledge with the technical community and beyond. I dedicate this book to the memory of my mother, Jaqueline Price, and my grandmother, Mary Price, for instilling in me the belief that strong, smart women can accomplish anything. Lastly, thanks to my son, Jaire, for his support and for sharing me with this book as I spent many hours locked away writing.

– Angel Wood



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It has been a long ride with SharePoint, but I would like to personally thank some key people and entities that have helped my career when I needed it most: Microsoft, for the opportunity to work as a PFE supporting SharePoint from 2011 to 2013, and the PFE who told me I would never make it at Microsoft; Marion and Dallas Bishoff, for giving me an opportunity to push myself to be a consultant; the teachers I have had throughout the years of schooling, who have been positive and negative with me; finally, thanks to those who shared tech concepts without thought or apprehension. These many thanks go to ALL of you!

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Preface

Implementing Microsoft SharePoint 2019 is a technology book that covers the ins and outs of SharePoint implementations with a view from the field. We give solutions to an array of problems as well as step-by-step guidance to provide an easy-to-read book that helps you plan and manage SharePoint Server 2019 implementations. In this book, we provide insight on questions you may have around planning, assessment, governance, installation, configuration, integration, and a host of developer topics. The book provides the information required to bridge the gap between on-premises and cloud hybrid solutions to support an all-encompassing SharePoint 2019 project.

Who this book is for

This book is for SharePoint administrators, developers, and architects who have some experience in designing, planning, implementing, and managing SharePoint Farms.

What this book covers

Chapter 1, Understanding Your Current State, helps you figure out the state of your current environment to find out what will change and what you need to have a successful SharePoint 2019 implementation. This includes new environments as well as the governance that these environments need, as we'll discuss in this chapter.

Chapter 2, Planning and Architecture, talks you through reviewing and assessing your current environments, which will help you understand what you need to change and update in your new environment. The planning and design of infrastructure (be it on the cloud or on-premises), server resources, redundancy, and team resources are also explained in this chapter with many other related scenarios.

Chapter 3, Creating and Managing Virtual Machines, sees you creating server resources to support SharePoint Server 2019 using Hyper-V and Windows Server installations. You will also learn to understand how these resources can be configured for the best performance to support SharePoint Server 2019.

Chapter 4, Installation Concepts, teaches you how to best install SQL Server to support SharePoint Server 2019 step by step and also provides a step-by-step guide to SharePoint Server 2019 installation to complete the installation of the server process.

Chapter 5, Farm and Service Configuration, covers SharePoint Server 2019 logging and services, along with instructions on how to configure the services within the farm to achieve the best configuration. We also review MinRoles and how they can be used strategically, along with a good review of the Distributed Cache service.

Chapter 6, Finalizing the Farm – Going Live, sees you do some final configuration of services, specifically the Search and User Profiles services. You will create web applications and learn how to extend web applications using zoning and alternate access mappings.

Chapter 7, Finalizing the Farm to Go Live: Part II, walks you step by step through the installation and teaches you more about integrated applications such as Workflow Manager. We talk more in this chapter about authentication, software and hardware load balancing, and migration concepts, and complete some final checks before we release our environment to our user community.

Chapter 8, Post-Implementation Operations and Maintenance, is dedicated to day-one scenarios and discusses how to prepare and what work needs to happen on the cutover weekend. We pose many common questions at the beginning of this chapter that are answered with our experience from the lessons we've learned to help prepare you. Applying SharePoint updates and other maintenance is also covered in this chapter.

Chapter 9, Managing Performance and Troubleshooting, reviews the client's and developers' roles in maintaining the performance, tools, and stability of your SharePoint 2019 farm. We also discuss administrative responsibilities around the performance of your farm and look at which areas to support for the best possible performance. Troubleshooting is also discussed in the areas with tools and we provide some scenarios and fixes from our own experience.

Chapter 10, SharePoint Advanced Reporting and Features, looks at deprecated reporting features, such as Excel Services and BI, and what new features are offered as replacements in the configuration of SharePoint Server 2019. We also dive into connecting to the cloud and the options available once hybrid connectivity is in place. Since Power Tools are important, we go through each tool that includes Azure integration and how they can be used with your on-premises environment.

Chapter 11, Enterprise Social Networking and Collaboration, is dedicated to showing you Microsoft Teams and how it has changed how we communicate in the new cloud and SharePoint Server 2019 environment. We also show you some other cloud social tools that are easily integrated into SharePoint Server 2019. If you are looking to use Live Meeting, we have included some high-level details on setting up Teams for small auditoriums.

Chapter 12, SharePoint Framework, is dedicated to developers and what they will see has changed in SharePoint Server 2019 farms. We give recommendations on the tools and languages that developers need to get familiar with and some best practices to follow. We also walk through SPFx and the setup of Node.js step by step.

To get the most out of this book

To be prepared for this book and to emulate the concepts discussed, you will need to have access to server resources. Please have an environment you can use to follow the step-by-step instructions as part of the book.

Software/hardware covered in the book	OS requirements
Hyper-V	Windows only
SharePoint Server 2019	Windows only
PowerShell	Windows only
SQL 2017 or Server 2019	Windows and Linux
Visual Studio Code	Windows and Mac
Node.js	Windows, Mac, and Linux
Microsoft 365 subscription	Cloud tenant

You will have to download some of the integrated tools, such as SharePoint Designer 2013, InfoPath 2013, and others mentioned throughout the book, to use them and install them on a desktop. We do not cover these tools within the book, but research and practice with them to learn how to develop workflows and forms.

If you are using the digital version of this book, we advise you to type the code yourself or access the code via the GitHub repository (link available in the next section). Doing so will help you avoid any potential errors related to the copying and pasting of code.

If you are looking to follow along with the book and build while you read, then be prepared to get your own server or a hosted server in Azure or AWS to set up your environment. This will require the purchase of either a used server from eBay or a subscription to one of the cloud services mentioned here.

Download the example code files

You can download the example code files for this book from GitHub at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>. In case there's an update to the code, it will be updated on the existing GitHub repository.

We also have other code bundles from our rich catalog of books and videos available at <https://github.com/PacktPublishing/>. Check them out!

Download the color images

We also provide a PDF file that has color images of the screenshots/diagrams used in this book. You can download it here: https://static.packt-cdn.com/downloads/9781789615371_ColorImages.pdf.

Conventions used

There are a number of text conventions used throughout this book.

`Code in text`: Indicates code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles. Here is an example: "Mount the downloaded `WebStorm-10*.dmg` disk image file as another disk in your system."

A block of code is set as follows:

```
# Get the Web Application
$WebApp = Get-SPWebApplication "https://my.company.com"
#Loop through all site collections and Set read only status
foreach ($SPsite in $webApp.Sites)
{
    $SPsite.ReadOnly = $truePost-implementation 11
    #Or : Set-SPSiteAdministration -LockState "Unlock"
    -Identity $SPsite.url
}
```

When we wish to draw your attention to a particular part of a code block, the relevant lines or items are set in bold:

```
[default]
exten => s,1,Dial(Zap/1|30)
exten => s,2,VoiceMail(u100)
exten => s,102,VoiceMail(b100)
exten => i,1,VoiceMail(s0)
```

Any command-line input or output is written as follows:

```
Set-SPLogLevel -TraceServerity verboseex
```

Bold: Indicates a new term, an important word, or words that you see onscreen. For example, words in menus or dialog boxes appear in the text like this. Here is an example: "Select **System info** from the **Administration** panel."

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1

Understanding Your Current State

The current state of your environment is critical in how you proceed to start a new enterprise SharePoint implementation, migration to a new version of SharePoint, hybrid integration, or migration to the cloud. There are many checks and balances you need to understand before moving forward with your SharePoint project. The reason most projects fail with SharePoint is the lack of understanding and gathering of facts on the environment from the enterprise, governance, content, customizations, errors, and server configuration levels before you begin. Assessing the good and the bad in these areas gives clarity on what needs to be planned, designed, and implemented to be successful. This chapter will help you understand those areas that need to be identified to be changed, updated, documented, and corrected before proceeding to new versions of SharePoint, including the Microsoft 365 cloud.

The following topics will be covered in this chapter:

- Deprecated features
- New features
- Accessing the environment
- Best practices
- Governance

Technical requirements

The following will help you gain a better understanding of this chapter:

- Current experience with SharePoint farm administration to support 2007, 2010, 2013, and 2016
- Current enterprise planning and or project planning to support a collaborative user community with SharePoint
- 2–3 years of collaboration and or system implementation experience

Warning – deprecated features

In my years as a SharePoint architect, I have come across different definitions for various terms, and the meaning of the term "deprecated" always comes up in conversation. When defining the word "deprecated" and Microsoft's use of the word, I want to make sure we are on the same page to ensure we understand Microsoft's intentions before going forward. The features listed in this section will be referred to as either deprecated or removed features.

Microsoft defines deprecated in a couple of different ways, as seen in their documentation online. One definition for the word deprecated as used by Microsoft is *no longer making updates to features listed within SharePoint*. In this definition, we need to understand, as SharePoint professionals, that this means Microsoft is suggesting that customers do not rely on these features if they have not used them before. The features listed are supported in SharePoint Server 2019 as Microsoft still supports these features for those companies still making use of them.

The reason for discouraging customers from investing in these features is that the features listed have the potential of being removed from the product soon or are possibly on the list for removal. If you are new to SharePoint and one of the features that comes up in this section is something you were hoping to use for your environment, please explore other options from a third-party vendor or start using an integrated product that can reclaim the features for use in your environment.

If a feature is referred to in this section as "removed," then we will consider this feature *not available and no longer supported by Microsoft in this version of SharePoint*. This often brings tears to my eyes, as some features can be widely used within your environment by the user community. When relaying this information to a customer, this can be tough, but it is important because you want to present a clear path to success. This also gives us, as consultants and engineers, the opportunity to define how to recover from those features that are lost. It is essential that we give our user community confidence that we will find a way to make up for the lost functionality during our planning process. Third-party solutions can sometimes be the answer to this issue but be careful with what third-party companies you agree to purchase from. We will talk about third-party components later in the book.

As you can see from these first four paragraphs, understanding your new application software product version is one of the keys to success for planning and designing your implementation. When installing fresh with no need for migration of a prior product's content, this section may not be too useful to you; however, for those of you who are upgrading and migrating content to this newer platform, this section is very important to give clarity on the server platform, integrations, user features, administration changes, developer platform changes, and other areas of the product that could have changed between SharePoint 2016 to SharePoint 2019.

If you're migrating from other versions, such as 2007, 2010, or 2013, you will need to go back and make a list of changes from all versions to see what features and changes have happened between those versions as well. The reason we need to do that is that if you're using SharePoint 2007, there will be a lot of change associated with your move to SharePoint 2019. This change will bring a host of user questions, from the UI to site collection features. Admins will see a big change in administration areas and how and what other Microsoft products integrate within the product currently.

As part of understanding this platform, we also want to start making a list of areas lacking in the supportability of the product. We will need to support all aspects to fully integrate this platform into the enterprise.

Training and other aspects of learning are essential for users as well as admins to make sure they do not get lost when implementing the product in the enterprise. Users' understanding of the site features, how to navigate the sites, UI changes, and overall SharePoint product progression through versions are essential use cases for requesting training as part of this implementation. Training is something you do not want to leave out as part of this project, even from a new installation perspective. I have seen one implementation where no training was given to users and the product was not used effectively for 10+ years due to the users not understanding how to effectively use the product.

Customizations you activated as third-party solutions and developed as custom solutions that were used in prior versions of SharePoint may not work in this new version of SharePoint. If you are using customizations in SharePoint versions 2007 up to 2013, you will have to test to make sure those customizations are available through the vendors you purchased them from to support SharePoint 2019. A lot of companies that were thriving with the 2007 SharePoint custom solution market may no longer be around, so this will need some research on the company and/or finding a replacement for the solution.

FAB 40 templates come into play as well in older versions of the product. These templates were retired during the release of SharePoint 2010 and are no longer valid for newer versions of SharePoint. Customized solutions by developers will need to be vetted and redeveloped for SharePoint Server 2019. We talk more about migration in the future chapters of this book, and there I will give you more in-depth information on what you should be migrating and things to watch out for during the process.

Deprecated features

The following listed features are deprecated in SharePoint Server 2019.

Access Services 2010

Access Services 2010 was the first step in taking desktop one-user databases and making them available for sharing through SharePoint. The service gave us the ability to publish an Access file and secure it for viewing and editing for those peers who had access. Access Services 2010 will remain supported but will be deprecated within this new version of the product.

There are alternatives to replacing Access Services 2010 as Microsoft has made available Power Apps and Power Automate. If you're new to SharePoint, this would be a good time to look at the alternative solutions first to provide those same features to replace this service and database type. If you are using these services, I would start migrating data from these databases and creating new solutions using Power Apps or a relevant third-party solution. Another alternative is to use SharePoint lists in place of Access databases, which can help in some small applications developed on that platform that bring better sharing experiences to the application.

Access Services 2013

Access Services 2013 provided data used within these services to be used within SQL tables, while Access Services 2010 data was captured in a SharePoint list. This service is deprecated in the SharePoint Server 2019 release. I recommend that you migrate all Access applications to Power Apps. If these applications require support for business processes, enhance them using Flow. These applications are considered as potential alternatives to support the functionality within SharePoint 2019.

If you are new to SharePoint, I recommend you start with the alternative products, and if you are using these services currently, start migrating from this service to a new solution that can be provided by these new applications and or third-party solutions.

Aggregated newsfeed

The newsfeed was used to post status updates with everyone on a landing page or within specific sites where you had permissions to do so. As users saw your post, they were able to reply and continue responding to the conversation, as seen in similar functionality on other social platforms. Users could also like your posts as well using the newsfeed. The newsfeed functionality, which was made available by way of `newsfeed.aspx` and mainly accessed via the **Newsfeed** tile in the app launcher, will be set to read-only. The tile located in the app launcher will be removed, as well as the option to create newsfeed capability.

If you are currently using the newsfeed capabilities, I recommend other alternatives, such as Microsoft Teams or Yammer, but I would be wary of adopting Yammer as a full solution at this time as I see this being a potential removed or deprecated feature soon.

Help content

In the past, content to support help within sites had been ineffective in supporting users. We as administrators depend on this to give relevant information to users for issues they may run into during their experience or even some instructions for how to manipulate content within SharePoint. This has not been the case from my perspective in older versions of SharePoint and it really needed some fine-tuning to get the type of information to support the product efficiently.

Within this version, enhancements have been completed to make sure users access quality help content. Help content will also be consistent and centralized as it will be accessed by syncing with the Microsoft 365 help engine. Support for the legacy on-premises integrated help engine will be a thing of the past. In this release, the legacy SharePoint help engine will remain supported. The help content in the legacy help engine will be deprecated.

Groove sync client

In past versions of SharePoint, the Groove sync client was used to sync documents between your personal devices and SharePoint Server 2010, 2013, and 2016 team sites. This client was a very unstable syncing mechanism that confused users and had some ups and downs throughout its life cycle. The reliability of this client has been talked about many times in blogs, at customer sites, and at conferences I have attended. This client is something desired for syncing offline synchronization documents when not connected to the network where SharePoint lives. It gives the user the ability to read documents and update documents offline, and when online, these changes are synced with the documents that have been updated.

SharePoint Server 2019 introduces support for a new OneDrive sync client. This client has been known as the new generation client and will provide a more reliable syncing experience. When using the Groove client in this version of the product, it will automatically update any SharePoint 2019 site sync relationships to the new OneDrive sync client. Administrators can also control this migration experience. The sync client will be supported but deprecated in SharePoint Server 2019.

InfoPath client and services

Almost every client I have visited recently and in the past uses InfoPath to build forms to collect information related to business processes. The potential problem is when the company has been relying on InfoPath for many years, taking advantage of developing these custom forms. Companies relying on these forms and heavily using them in their environment see that these forms would take a lot of time to move away from. Companies at this point would have to redesign the forms, build the forms in a new application, and rebuild the business processes around these forms so that they do not miss a step in their business. If I worked for a company that heavily relied on InfoPath, I would be looking at this time to start migrating these forms to alternative applications. These potential migrations can be completed with Power Apps and Power Automate.

There are also other alternatives from other third-party vendors, such as KwizCom, which feature a form replacement solution. Microsoft advises that customers should explore alternatives for InfoPath at this time. InfoPath services have been deprecated in SharePoint 2019 but will be supported. The use of InfoPath 2013 for designing forms is still supported within SharePoint 2019. The InfoPath client will be supported until 2026, but the InfoPath 2013 client will not be supported beyond this date.

Lists Web service

Since Microsoft Sync Framework, which supported the Groove sync client as well as the Lists Web service, depended on this framework, the following SOAP endpoints are deprecated as part of the SharePoint 2019 release:

- `Lists.GetListItemChangesWithKnowledge`
- `Lists.UpdateListItemsWithKnowledge`

Machine Translation service

If you didn't know about and/or are new to how this service works, the Machine Translation service provides language translation text from within the context of SharePoint. The application service will translate text from one language, such as Spanish, for example, to another language, such as English. This service will substitute one word in one language to its corresponding word in another language naturally. The Machine Translation service will remain supported but will be deprecated in this version of SharePoint.

PerformancePoint Services

If you are wondering how to support **Key Performance Indicators (KPIs)** and dashboarding in SharePoint, PerformancePoint is an integrated service to support these types of solutions. This service has been around since the 2010 version of the product. It's a cool integration, and as you can see, it will be replaced soon with newer alternatives mentioned in other areas of this section. At this point, it would be great to start migrating your solutions and moving away from this service so that you can be ahead of the game before it's too late. The reason for the deprecation of PerformancePoint Services is that it has dependencies on Microsoft Silverlight. This technology will no longer be supported as of October 12, 2021. PerformancePoint Services will remain supported in this version of the product. I strongly advise you to explore Power BI as an alternative to PerformancePoint Services. There are many new business intelligence enhancements being made due to big investments in Power BI.

SharePoint Designer

If we take a look at the progression of SharePoint over the years, you can see that SharePoint Designer was an essential part of the product versions released for 2007 and 2010. As Microsoft made major changes in 2013, you can see that SharePoint Designer would not be around much longer due to the integration of outside product integrations to manipulate SharePoint sites. We can also see that as the Microsoft 365 platform grows with product announcements, support for the replacement of SharePoint Designer is on the way. Microsoft has announced that there will not be a new SharePoint Designer client shipped with this release. Microsoft has also said that the SharePoint Designer 2013 product will work with SharePoint Server 2019 for the remainder of the client support life cycle, which is until 2026. SharePoint Designer 2013 will not be supported beyond that support life cycle. You can see that things are coming to an end for this product, but the question is when.

Site mailbox

Site mailboxes provide a way to centralize and share email using collaboration with teams and groups. With mailboxes growing due to the amount of email produced, this offers some options for teams, especially related to forwarding mail due to sharing project-related messages. Since this feature's introduction, there has not been much adoption and the feature has seen a decline since it was offered in Microsoft 365. Microsoft has made this feature deprecated in Microsoft 365 and now announced that they will also do the same for SharePoint 2019. The reason behind this is the decline in the use of the feature. Personally, I believe this is a great feature and I am not sure why more companies didn't move toward using it. Just the use of forwarding email within the enterprise probably takes up the majority of mailbox space to manage project and team-shared emails. I can only see good in this feature, but Microsoft has spoken. Shared mailboxes would be the alternative for the replacement of this functionality, and in hybrid scenarios using Microsoft 365 groups as an alternative.

Site manager

The main functionality of the site manager is now available in the modern document library copy/move announced on the Microsoft community website. The site manager feature will be supported, but it is deprecated in SharePoint Server 2019. Only site collection administrators will have permission to access the site manager page and the UI entry points to this page will be removed. You will have to know the page URL to get access to the feature. You can also copy/move content to OneDrive as well, as OneDrive is able to be browsed using this feature.

List of removed features

The following listed features are removed in SharePoint Server 2019.

Code-based sandbox solutions

During my travels as an engineer, I didn't see much use of this feature by corporate clients. I believe there was fear in using this feature as well as supporting the feature fully. There have been some instances I am aware of where this feature has created problems due to administrators being unaware of how it should be implemented and used by the user community. Microsoft announced, in the Microsoft Office Dev Center and in some other articles, that code-based sandbox solutions were deprecated in SharePoint Server 2013. They have also now been removed in SharePoint Online. Microsoft considered keeping this feature in SharePoint Server 2019, but they have decided to also remove support for code-based sandbox solutions in SharePoint Server 2019. Customers are recommended to explore SharePoint add-ons as an alternative, which are fully supported for both SharePoint on-premises and SharePoint Online. You can also take a look at SharePoint Framework Extensions, which have three extension types and can be used to extend the user experience using common scripting frameworks, such as Angular, React, or JavaScript.

Digest authentication

Microsoft will be deprecating the digest authentication feature in **Internet Information Services (IIS)**. This announcement came from the Windows team. When using the SharePoint prerequisite installer to prep the server for SharePoint, the installer will no longer attempt to install this Windows feature. When I have been on the road visiting many companies, I have never seen this authentication used for SharePoint. It seems Microsoft is aware that this isn't a very popular authentication mechanism. There are other alternative mechanism choices that could help those that use this specific mechanism. As alternatives, Kerberos, NTLM, and SAML are available to explore.

Incoming mail automatic mode

While this is a useful feature of SharePoint, I haven't seen this being used in many companies due to the dependency on a separate MX record being configured in the domain. This service also depended on IIS 6 Management Compatibility, which is a feature within IIS. The SMTP service within IIS used IIS APIs for the management of the service when using automatic mode for SharePoint incoming mail. There is no other way to manage the IIS SMTP service. This service is being removed to support automatic mode incoming mail. Customers who currently use incoming mail are advised to use advanced mode instead. The advanced mode gives you options to manually manage the IIS SMTP service and the drop folder.

Multi-tenancy

You may be surprised to hear that this was one removal I was hoping for. I have never been a fan of multi-tenancy. I think it brings too many challenges to the planning and design of the platform. It also brings challenges to the performance, configuration, and support of growing sites. There was the need to provide more support for this platform that just wasn't there, which made me stay away from recommending it to customers. Microsoft continues to innovate this feature in SharePoint Online but there is much more complexity in the configuration and bigger cost in providing this in the on-premises environment. Microsoft has announced that this feature will no longer be supported in the SharePoint Server 2019 release. Customers who are currently using this feature can still be supported up to the SharePoint Server 2016 version. Of course, you can always move to Microsoft 365, where it's fully supported.

PowerPivot Gallery and refresh

The removal of PowerPivot Gallery and refresh is not surprising to me. Since Power BI is now available and built to be standalone-capable, Power BI is now more ready to support SharePoint in a more robust way. Power BI will be a force as now the capabilities can be pushed to the limit, integrating the product as its own server instead of running it as a service, which sets this product up for a great future. Power BI Desktop works with a different file extension, PBIX, which you can then use to migrate Excel workbooks to Power BI Desktop.

Visio Services – Silverlight-based rendering

Silverlight will no longer be supported as of October 12, 2021. Since there are only two options for rendering Visio diagrams – Microsoft Silverlight-based and PNG-based to support SharePoint 2019 – Silverlight is no longer available within SharePoint Server 2019 and you will have to render Visio diagrams using PNG-based technology.

SharePoint business intelligence scenarios

Looking over the SQL Server Reporting Services Team blog post referenced on Microsoft's SharePoint 2019 new and improved features page, I have recently seen the changes related to SharePoint services from the SQL installations. If you refer to SQL 2016 and SQL 2017, you will see the differences in support for SQL Reporting Services, as SQL 2016 only provides integration for SharePoint Reporting Services features. I know from experience after writing many SQL Reporting Services reports that this feature has some issues that need to be improved upon. Microsoft has made some changes as native mode will be a standalone Power BI solution that you can deploy whether you have SharePoint or not. This mode of support for reporting services provided in SQL Server is different, as you can see from the differences between SQL 2016 and SQL 2017. With this new way of integration, you will see a modern web portal, paginated reports, mobile reports, KPIs, and much more. Available as well is an on-premises data gateway for hybrid environments, which gives the capability for users in the cloud to be able to use Flow and Power Apps. You will also be able to interact with Power BI reports in your web browser for the web-based viewing of Excel workbooks. (Watch out for PowerPivot users.) The scenarios that have been supported in this service are the following: embedding reports in SharePoint pages, reporting on data in SharePoint lists, and delivering reports to SharePoint libraries.

There is also a migration script available to migrate your reports from SharePoint integrated mode to native mode. Power View reports can be converted into Power BI reports, and with that evolution, you can also import your Excel workbooks in to Power View and then to Power BI to start converting your content. This sounds like a much better way to tackle reporting in SharePoint and I'm happy to see that they have done something different with SQL Server Reporting Services to alleviate some of the issues we have seen using Reporting Services.

Now that we have seen what features are to be deprecated or removed, let's see what new features SharePoint Server 2019 have to offer.

New features

With the ever-changing SharePoint platform, I want to make sure you understand all of the changes to this new platform before proceeding to the installation of the product. It is easy to get lost in the mix of all the changes and information you may see online. This is not to say do not check behind me. As I write this book, things could be changing at the same time. So, make sure to do that but also make sure to document and plan this implementation well. Leaving out any crucial details during this assessment could bring about a migraine headache, so please be thorough and make sure to work as a team with other IT areas for support of this SharePoint 2019 on-premises implementation.

As part of our assessment to understand your current state, we also need to investigate new features. This is useful for both those new to SharePoint Server and those that have implemented SharePoint with prior versions of the product. New features cover many different areas within the platform, as we saw in the *Deprecated features* section of this chapter. As part of this section, we will list the same areas of changed components so that all bases are covered to start planning and designing your implementation. As we saw in SharePoint 2016, there were many changes to the platform. Integrations that once were common were not common anymore. The installation has become more complex but for good reasons, as server components have been individualized for performance. So, in this version, we need to expect the same types of updates and even more integration with Microsoft 365 using the hybrid features.

Here is the list of new features for SharePoint Server 2019.

Service application enhancements

A change has been added to the Access Services 2013 service application. The service now supports the Send Email action for sending email messages from within the application. This is a nice new feature to have, and I know a lot of users will look forward to using it with this version of SharePoint. I know that when working with customers, this was a feature that was often needed.

Additional documentation links for central administration

As administrators, we always look for the latest and greatest information on the products we support. I can vouch that sometimes finding information that supports SharePoint on the Microsoft website is tough to do. I don't believe it's meant to be tough to find, but sometimes just finding the right information to support something we are trying to accomplish or need for support of new endeavors takes some time. Since so many people blog and try to post what they find out first through Microsoft channels, these sites can weigh in to find reliable information directly. Microsoft, in support of SharePoint using links within central administration, makes it easier for farm administrators to find information and reach the latest SharePoint administration documentation. They can also find the latest public updates by adding links to the SharePoint central administration home page:

SharePoint Server

This guide helps IT Pros plan, deploy, and manage SharePoint Server 2016 and 2013 in their enterprise environments.

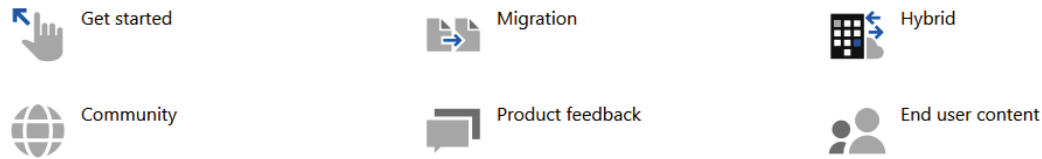


Figure 1.1 – SharePoint support home page

The site is well organized and categorized for a quick turnaround on what you're searching for. I really think this will go a long way for admins and developers across the world who support the product and keep things centralized to find reliable information.

Communication sites

Communication sites hit the scene in SharePoint Server 2013. These sites were created to help better share news, showcase stories, or broadcast messages to other users within the site. With communication sites, there is now a new Hero web part that can display up to five items with rich images, wording, and associated links to draw attention to the content you deem as highly visible on your communication site.

Fast Site Creation

Fast Site Creation was introduced in SharePoint Server 2016. Although I have seen performance data captured on this negating the feature of creating sites more quickly, in this version of SharePoint 2019, significant performance areas have been enhanced and you can see a major difference in the creation of sites. Only certain templates can be created using this method and are listed as follows.

Fast Site Creation can use these templates:

- OneDrive personal site [SPSPERS#10]
- Team site (modern only) [STS#3]
- Communication site [SITEPAGEPUBLISHING#0]

Fast Site Creation is used when creating sites in the following entry points:

- OneDrive personal site auto-provisioning
- The **Create Site** button on SharePoint home
- The New-SPSite PowerShell cmdlet with the `-CreateFromSiteMaster` switch parameter

Increased storage file size in SharePoint document libraries

Microsoft has increased the file size limitation for files to 15 GB. This gives us a new maximum file size we can support and import into our document libraries. With this, we must be careful and conscious of what we plan for disk sizes during our implementation. We want to make sure that if we are using this maximum size, we account for that with our disk space. Remember, shredded storage is still in play, so when we turn on versioning, we only retain the changes made to the file and not another copy of the file with those changes. There are some best practices you can follow to help relieve your environment from performance issues with these large files.

Modern lists and libraries

Within older versions of SharePoint, we saw lists and libraries as classic experiences. SharePoint 2019 brings a whole new experience to our lists and libraries, which can be seen in the list and library pages. The lists and libraries in this modern experience make it easier to make updates and change what was normally in the list or library settings.

Modern sharing experiences

In older versions of SharePoint, sharing content was a task that took a little time to achieve. Since SharePoint 2019 uses the modern experience you see in SharePoint Online, you will notice that sharing is now at your fingertips with the interface you need to keep security a focus. Another new enhancement is that you will be warned if you are sharing to a large group or sharing a large number of items, which comes in handy when using **Active Directory (AD)** groups.

The modern experience is here in SharePoint 2019. You will now see the modern experience in sites and other pages as seen in SharePoint Online. Not all features that SharePoint Online exhibits are available in SharePoint 2019 on-premises. Adding new site pages creates a new modern experience, which gives you enhanced improvements. These pages are easy to create by just clicking in **Site Actions** and clicking **New | Site page**.

Modern search experiences

SharePoint Server 2019 offers an enhanced search experience in addition to the classic experience seen in older versions of SharePoint. In this version of SharePoint, the results are populated as soon as you start to type in the search box. There are some differences we will explore later in this book from a search administrator's point of view but the user experience has been updated for faster search results.

Modern team sites

SharePoint 2019 brings forth the experience of modern team sites, which also brings a new and fresh user experience to SharePoint sites. The home page has been redesigned and improves the display of content so that the most important information is presented. This new page also improves on discovering the most common tasks as well. Again, as stated in the communication site, as a new feature, users can create modern team sites from the SharePoint home site without needing IT to help them. SharePoint Server 2019 continues to support creating classic team sites as well for those who may want to continue using them.

Sharing using modern internet information APIs

With sharing, using modern internet information APIs, I have waited for this API change for many years as we were always stuck using the IIS6 APIs even up to SharePoint 2016. Microsoft has modernized its integration with IIS, which in the past was used in conjunction with legacy IIS6 APIs. In SharePoint 2019, Microsoft has removed all dependencies on IIS6 API components and now uses the IIS7+ APIs to manage IIS. IIS7+ APIs are the latest and greatest supported APIs from Microsoft. With the integration of these latest and greatest APIs, we can now more easily adopt new IIS features and with this integration, IIS will provide seamless integrations with Windows Server releases. Since this change has altered how we install SharePoint from a backward-compatibility standpoint, the following Windows Server features will no longer be installed by the SharePoint prerequisite installer: IIS 6 Management Compatibility (Web-Mgmt-Compat), IIS 6 Metabase Compatibility (Web-Metabase), and IIS 6 Scripting Tools (Web-Lgcy-Scripting).

SharePoint home page

The SharePoint home page has changed in SharePoint 2019. The home page now uses a modern UI experience that gives users more integrated access to all their sites online and on-premises. This new modern experience saves users' time by bringing everything together in one unified view. It allows users to browse their intranet and see activities across the site, as well as shows a personal view of all team news. The SharePoint home page has now been changed to give users direct access to create new, modern sites using self-service site creation, which was never available in other SharePoint versions. The home page can be reached by clicking the SharePoint icon in the SharePoint app launcher.

Creating sites from the home page

As I have stated in this chapter, the self-service site creation experience now supported in the new SharePoint home page now supports creating new sites in a different web application. The new self-service site creation feature will allow you to decide whether the web application is hosted locally or in a remote environment. When creating site collections, you will see options for creating sites in the same web application or options for other web applications in the same farm. You can also create sites in remote site collections using the remote web application drop-down field.

Site creation support for AAM zones

When creating sites using the self-service creation on the SharePoint home page, it fully supports **Alternate Access Mapping (AAM)** zones. Sites can be created using different web applications from local and remote farms. External resources have to be created on both farms for this type of site creation to be available. This process would apply for the same web application, sites created in a different web application on the local farm, and sites created on a remote farm.

This brings a different experience for site collection admins as they will be able to create a site on any web application they manage. This will help bring faster results when sites are requested, and the site collection admin will be able to reach across platforms and web applications to create these sites.

SMTP authentication when sending emails

Microsoft has made some big changes in how you can use SMTP within a SharePoint farm. SharePoint 2019 now supports authenticating to external SMTP servers when sending email messages for notifications. Authentication for the connection can be configured through the central administration website or through PowerShell. SharePoint Server 2019 also supports connecting to external SMTP servers that accept anonymous connections. This new SMTP feature makes it easier for administrators to adhere to requirements for integration of SharePoint into highly secure environments where authentication is a requirement. Admins will no longer need to configure smart host relays for SharePoint farm environments.

Use of # and % in file and folder names

Microsoft has made changes for document and folder names. SharePoint 2019 now supports the # and % characters being part of naming in lists and libraries. Including these characters makes it easier to sync content from personal storage devices to SharePoint.

Syncing files with the OneDrive sync client (NGSC)

As mentioned in the *Deprecated features* section, the Groove client has been changed. The Next Generation client will now be available and will be used for OneDrive synchronization as well. The client will sync files within your SharePoint Server 2019 team sites and personal sites with all your devices. The client will be a lot easier to use and supports some advanced features, such as push notifications, IRM protection, and Files On-Demand. IRM is a key feature, as this will keep the rights management policies associated with any documents synced to your devices.

PowerShell enhancements

This section lists the new PowerShell cmdlets for SharePoint Server 2019.

New user profile synchronization PowerShell cmdlets

As you can see from this chapter, Microsoft has been in the process of converting the old STSADM commands from SharePoint 2010 and 2007 to PowerShell. In this version, the `stsadm.exe -o sync` command has been converted but has been separated into a few different PowerShell cmdlets, as shown:

- `Get-SPContentDatabase` cmdlet with the optional `-DaysSinceLastProfileSync` parameters: This command is used to return content databases that haven't been synchronized with User Profile Service.

- `Clear-SPContentDatabaseSyncData` cmdlet with optional `-DaysSinceLastProfileSync`: This command is used to clear user profile synchronization information from the content databases in the farms that haven't been synchronized.
- `Update-SPProfileSync` cmdlet: This command is used to update the user profile synchronization settings to update the main synchronization schedule, identify new users in the sweep schedule, and exclude web applications from synchronization.

The `stsadm.exe -o sync` command will also be supported for those who still rely on STSADM.

New Get-SPContentDatabaseOrphanedData PowerShell cmdlet

In older versions of SharePoint, we used the STSADM `stsadm.exe -o enumallwebs` command to enumerate all webs using the command line. This command has now been converted into a PowerShell cmdlet. You can now use the new `Get-SPContentDatabaseOrphanedData` cmdlet and run it against content databases to find any orphaned data within it. The `stsadm.exe -o enumallwebs` command supports backward compatibility.

New Set-SPApplicationCredentialKey PowerShell cmdlet

Due to the changes in SharePoint 2019, Microsoft is converting all `stsadm.exe` commands into PowerShell. The `stsadm.exe -o setapppassword` command has been updated in SharePoint 2019 to be used as a PowerShell cmdlet. You can now use the new `Set-SPApplicationCredentialKey` cmdlet to set the application credential key on the local server. Services affected by this command are the SharePoint People Picker control and SMTP authentication. The `stsadm.exe -o setapppassword` command is still supported as an option for backward compatibility.

New Remove-SPApplicationCredentialKey PowerShell cmdlet

The new `Remove-SPApplicationCredentialKey` cmdlet and administrator user rights give access to remove the application credential key from the local server. The impact level of this cmdlet is set to high due to the fact that removing the application credential key from the local server will either cause a block of functionality or degrade the ability for the service affected to function properly. Examples of services that could be affected are the SharePoint People Picker control and SMTP authentication.

New health analyzer rules

The health analyzer serves as a way to warn us when configurations and other areas of SharePoint are out of line with best practices. These new health rules will help us to support our SharePoint Server 2019 farm in many new ways:

- **People Picker health rule:** The People Picker health analyzer rule has been added to detect whether servers in the farm are missing the encryption key. The encrypted key is needed to retrieve People Picker credentials in SharePoint. The new health analyzer rule detects when the People Picker is configured to find users in another forest or domain with a one-way trust to the SharePoint farm's domain. When the rule is run, it returns information if the rule finds any missing encryption keys. The process will then notify the SharePoint farm administrator.
- **SMTP authentication health rule:** There is a new SMTP authentication health rule that has been added for SMTP authentication. This health analyzer rule notifies the SharePoint farm administrator if any servers in the SharePoint farm are missing the encryption key needed to retrieve the credentials for authentication.

Improved features

The following listed features are improved in SharePoint Server 2019.

Distributed Cache now uses background garbage collection by default: Distributed Cache, during my travels helping customers, has always been a configuration left out and forgotten. This configuration is very important to the stability of your SharePoint farm and should not be left out. Make sure to configure this as one of the first steps once your farm has been created and services are stable. Make sure to follow the Microsoft configuration best practices for this service to work effectively in your environment. In SharePoint Server 2019, Distributed Cache has changed to include AppFabric velocity cache. AppFabric velocity cache will be used for background garbage collection. This new component helps to provide a more sound experience for features that depend on the Distributed Cache service.

File path limit of 400 characters: In SharePoint Server 2019, the file path length limit was increased from 260 characters to 400 characters. The file path is all the characters used when typing in the URL after the domain or server name and port number. This will be helpful as it can help with content that may be nested within sites that require longer URLs.

Hybrid experience improvements: In SharePoint Server 2019, there is a new hybrid status bar located at the top of the central administration page. The minimum requirements for hybrid connectivity are:

- A reverse proxy
- STS certificate
- Inbound connectivity
- Operational Active Directory (AD DS), SharePoint Server Farm, and Microsoft 365 Organization (E1 – minimized functionality with hybrid federated search results only, E3 and E4)

Once the farm has reached the minimum requirements needed to support the hybrid connectivity to Microsoft 365, the page will give you direct access to launch the Hybrid Configuration wizard. The links have also been added throughout the central administration site, so you always have access to get to the Hybrid Configuration wizard.

Recycle bin improvements: In SharePoint Server 2019, users can restore items they have deleted personally, along with other items that other users have deleted. Users would need to have edit permissions on the deleted items for them to be available in the recycle bin.

Sharing email template: Sharing email notifications have been updated to use the modern template design. We can now set the `SPWebApplication.SharingEmailUseSharePoint2016Templates` property to `true` so that if we want to continue using the previous email sharing template, we can do so.

Suite navigation and app launcher improvements: Microsoft has changed the suite navigation and app launcher experience in SharePoint Server 2019. The experience using these interfaces is very similar to the Microsoft 365 experience. Users using the hybrid experience will now have a seamless experience using both SharePoint Server 2019 and SharePoint Online.

The SPFX Framework: This is the latest from Microsoft to support the development of custom web parts for both SharePoint and Teams clients. The SPFX Framework is used to customize modern sites, but modern sites cannot be fully customized. Developers can use Angular, React, or JavaScript with SPFX for customizing SharePoint. We can also integrate many applications with the modern UI easily but the developer has fewer options compared to developing on classic sites. Classic sites are fully customizable using JSOM and CSOM along with the REST API for customizing classic sites. There is now increased support for JSOM and CSOM.

Telemetry privacy experience: SharePoint Server 2019 now has an updated telemetry management experience. As you set up your farm, you can provide an email address that will be used for the telemetry contact as part of your organization. This is in anticipation of future telemetry reporting capabilities that will allow customers to associate SharePoint Server and OneDrive sync client telemetry with their hybrid tenancy. The email address provided cannot be used outside of the SharePoint farm. This address will not be sent to Microsoft for any reason. The farm data will be used to generate a unique hash value that represents your farm. This will make your data unique when uploading telemetry data to Microsoft. As customers start to associate telemetry with hybrid tenancy, the email address will be used as part of the process to show ownership of the data. If you do not want to provide this data to Microsoft, you have a choice to opt in or out at any time.

Visio Services accessibility: Visio Services has introduced a few accessibility improvements. The improvements are for high-contrast displays, keyboard navigation, and Narrator. Within Visio Services, users will be able to use the different panes from the keyboard shortcuts listed:

- Move focus to the **Comments** pane = *Alt + R*
- Move focus to the **Shape Data** pane = *Alt + S*
- Move focus to the canvas = *Alt + C*

Server support updates

Server support updates include updates that have changed in the server creation or what the server supports as part of the installation for SharePoint 2019. There were also a few changes in SharePoint 2016 that are well documented, which if you are upgrading you may want to review as well. This does not include server specifications or configuration information, only newly supported and non-supported updates:

- **Drive filesystem support:** SharePoint Server 2019 provides support for drives that are formatted with the **Resilient File System (ReFS)**.
- **Single-label domain names:** SharePoint Server 2019 will not support single-label domain names.

- **SQL updates:** In prior versions of SharePoint, SQL Server Express was supported to provide a single server installation for the quick setup of SharePoint Server. In SharePoint Server 2019, SQL Server Express is not supported as you will have to install a separate SQL Server instance to support even a small test or development environment. In Azure, the use of SQL Azure (the SaaS service) is not available for support for any SharePoint databases. Please take note that these changes will change the way you provide lower-level environments.
- **Office client installations:** SharePoint Server 2019 does not support Office applications installed on the same computer. The minimum supported version for SharePoint 2019 is the Office 2010 client.
- **.NET Framework 3.5:** As admins, we are aware of how to install .NET Framework 3.5 on our servers when preparing our operating systems for SharePoint. Prep for .NET Framework 3.5 will continue to be supported using a manual installation as there have been no updates to improve this feature installation for automatic install using the prerequisite process.

Now that we have identified all the areas where there are new features within SharePoint 2019 and have learned about the old features that have been deprecated, we can now focus on how we move forward with our new farm configuration. Moving forward takes documentation and thinking about what our goals are for this project in terms of the administrators and users who use the services.

We will start that process in the next section of this chapter with accessing the environment, which will give us the opportunity to see where we are in the current environment and where we need to be in the new environment. This also gives us the opportunity to understand where features will be enhanced and where features will stay the same or be non-existent in our new environment. Having this laid out now will help you design the right solutions to support the users that currently use the environment so that no interruption to services happens during the migration; or even if you are starting from scratch, this helps to match requirements to the services you are providing in the farm.

Assessing the environment

As stated in this section's title, our first order of business is to find out what we have in our current environment, what's changing in the new environment, and what's new in the new environment with regards to SharePoint Server 2019. We began this chapter by looking at deprecated features, removed features, and new features for SharePoint 2019. Now, we need to look at our current environment to see where we are now and how we can improve it. This is very important to figure out how SharePoint is running if you have a current farm configured in your enterprise before going forward with a new implementation. This should also include multi-cloud deployments that end up eating your costs and you paying more than you were in on-premises financial support.

Assessments can be done in several ways. You can do the assessment yourself using a team within your IT department to find out all the details and assess where your current environment stands, or you can hire an independent contractor to come in and figure out your current state for you. Microsoft also offers these services as well, where they run tools to export your information about your farm and ask questions about your organization's processes and how you manage the environment.

I can vouch for this risk assessment done by Microsoft because I have done these while working at Microsoft as a **Premier Field Engineer (PFE)**. This process is very thorough and you will receive a report after the engagement to let you know of things you have missed and things that you are doing well. This will give you a baseline and you will need this going forward as you start your new project for your move to SharePoint 2019.

Even when you are starting a new SharePoint installation from scratch, it really helps to spend a day with seasoned professionals combing through your environment and figure out all the things that are working and not working to support your new farm. This would include overall configuration, network stability, server performance, network, farm design, best practices, and other IT-related and non-IT organizational information.

The intent of an assessment is to provide findings to help align your farm to best practices in the industry and design your farm accordingly. Even if your current environment is not stable, you can still fix issues that may hinder you from moving forward before starting the project, which will give you a better baseline on how your new environment should be configured.

To understand your SharePoint environment's state, this would mean looking at the details of the farm from these areas and documenting each one of them:

- Authentication methods
- Web applications
- Customizations

- Workflow
- Application services
- Search
- Farm configuration
- DEV, TEST, and production environments
- Content database health (unused, version, and size)
- Orphaned sites and site collections
- Custom and third-party solutions, active and inactive
- Server health (Windows logs)
- Server performance and configuration (SQL and SP)
- Farm Health Analyzer issues
- Microsoft update status
- Governance health
- Organizational health for support of the environment
- Network performance and issues
- Current known issues
- Multi-cloud complexity

Grades should be given to each area assessed so that you can determine the next steps for that particular finding:

Green	Shows that the item was as expected and configured based on best practices	Green
Yellow	Shows that the item was close to being configured based on best practice state	Yellow
Red	Shows that the area needs reconfiguration to bring it to a best practice state	Red
Purple	Shows that the item was reconfigured during the maintenance and is now in a best practice state	Purple
Orange	Shows that the item was not tested during the assessment	Orange

Figure 1.2 - Grades

An example of an assessed item in our document is as follows:

SharePoint Health Analyzer	
Finding	More cache hosts are running in this deployment than are registered with SharePoint.
Summary Recommendation	Distributed Cache - we need to consolidate all the servers running the service to one Distributed Cache Cluster. One of the servers that is part of the cluster is down and some servers that were configured previously are still registered in the cluster.
Risk Status	

Figure 1.3 – An assessed item

The outcome of this assessment would be to develop a remediation plan based on the findings. This remediation plan could be used to clean up the current environment to support the migration or you could start clean and avoid the potholes you created in the old environment using a migration tool to migrate the content.

One thing I also want to point out is to make sure that your current environment is working and satisfying our user community. We may want to send out a survey or two to see what responses we get from our user community as well. One of the biggest errors we can make is only focusing on the technical aspects of this assessment and not the satisfaction of the users who use it every day.

There are also developers that work on this platform that we need to talk to as well. We want to make sure we are providing all they need in our current or new SharePoint environment to satisfy their workspace. Sometimes, developers are left out of talks as well but they are another big part of the whole equation. There are also servers and processes that they are part of that may need some tweaking in our new environment. These may require servers and software to bring the environment up to speed for them to use effectively.

This assessment process must be thorough and really doesn't have to take a long period of time. You can gather details in a month or so depending on the size of your environment and user community. Email is an effective way to gather interview results with short conversations on the phone. You can also create a SharePoint list to gather those requirements and list details about the solutions these users are looking for to help them with their workload. In the new environment, take some of those requirements for solutions and develop those solutions quickly to show how SharePoint can help, and show those solutions as a demo when you start talking to other departments about new requirements for new solutions.

Note

Remember that some solutions you develop will cross department lines, so we want to be able to know what solutions we have available in case another department asks for a similar solution. Keep a list of those solutions and details in a SharePoint list and on hand for demonstrations.

Other collaborative tools

In our assessment, we also want to look outside of SharePoint and see what applications our users are using in the enterprise for collaborating. Having conversations with your user community is key to moving forward with your new environment. It helps you determine how users want to use the collaborative systems that are currently in place and helps us to design the next environment to support some of their wish lists. This also gives the users a chance to tell you about any pain points or areas of concern they may have currently.

When assessing the user community, we need to talk to our stakeholders and see where we have failed in delivering collaborative support, which should be our first priority. During our governance stakeholder meetings, we should find out what the stakeholders are looking for to help them with their workload as well. There is also the need to see where they are in terms of being able to use the tools approved for use within the environment. This would show whether they have the ability to use the tools effectively on their own, which would have required some training in the past.

In environments I have assessed, there is always the question of "other" collaborative tools but these are never brought up by management or the IT staff that are out of scope with "approved applications." A lot of these departments are out of touch with the user community and have not reached out often enough to keep an eye on what's happening in their part of the enterprise. This is key to why governance is important and why this assessment will kick-start a new beginning for your enterprise application roll-out, now and in the future.

Keeping an eye on what's happening has been a complicated task because as we have moved forward in technology with other mobile apps and cloud applications that have been developed for collaboration, desktops have changed and platforms have been enhanced, such as mobile phones, which give users a computer in the palm of their hands. Users, in most cases, have not been restricted to use these tools either on their phone or through the browser. This brings up the question of what content is being used, how that content is being used, and why it's being used outside of our enterprise.

In this part of the assessment exercise, we need to focus on these outside applications and determine where these applications can either be used or replaced as part of our integrated SharePoint environment. Take, for instance, the case of using Slack; this is a common occurrence because some users use this application at home or for other personal use. So, obviously, they would be used to this application and view it as an alternative for work. If they can bring others on board in their group or department, then you have a rogue app being used for company intellectual property.

My point is not to demonize all apps or say that they're bad because they are not Microsoft-built, but I want to make it clear that we have to set boundaries on what applications are being used in our environment. We want to keep our data within the control of our users but also in control under our enterprise umbrella. The communication of these approved applications should be clear and written on your company's intranet.

Determining how to proceed or go forward is up to you. As in my example, Slack could be one of the mobile apps you see users applying to their business processes. When evaluating your state of collaboration, you may want to keep this in place or determine an alternative for them to use in place of that third-party application. Microsoft has introduced many new applications as part of the Microsoft 365 cloud that can be integrated with SharePoint on-premises and the cloud. Microsoft Teams would be a great alternative instead of using Slack because of its integration with SharePoint.

Make sure to assess all areas of collaboration, which includes wikis, shared drives, mobile apps, cloud applications such as Google Apps, and other areas of collaboration users could be using within your desktop and mobile platforms. Take these to the governance board and determine how to communicate these efforts to create a safe and secure environment for your company enterprise data so that nothing is shared outside of your control. Create requirements and use cases from these assessed areas as well to determine your path forward.

Our assessment is the key to the success of this project and I cannot stress enough the importance of knowing and understanding where you are currently. Again, even if you are starting fresh with SharePoint, this is an important step to go through and you should do what is told in this chapter. This really gives you the opportunity to start fresh and to make improvements to the service.

The biggest failures come from not knowing where you are currently and not being honest about where you are with errors/blotched configurations and where you want to go with the service for the future. Requirements and requests for services are missed. This could mean someone implements a separate system that does one of SharePoint's many processes and you could have included this in the overall SharePoint service agreement to support that new process.

With the assessment, you are looking at all of those areas to make sure you share the capabilities with others so that these duplicate applications do not get implemented. You can also avoid having duplicate solutions within SharePoint, but at the same time duplicate those solutions for others using the platform. Again, this goes for multi-cloud implementations as well as these seem to have spawned at a lot of companies. You need to do a deep evaluation and inventory at this time. This saves money and time!

As we go through our assessment, we will look at best practices that are given by Microsoft along with software limitations. This gives us a guide on what resources are required and their limits that we can use based on services within SharePoint. Best practices help us manage our server resources and understand what we need to run our environment with no processing bottlenecks.

Best practices

SharePoint is being improved by Microsoft within new versions of the software, which brings new features that require us as IT professionals to look at each version with a fresh set of eyes. Microsoft releases best practices for these newer versions of SharePoint to help us plan our environments based on the testing Microsoft does as part of its new product delivery. These tests push the limits and boundaries of the product, and based on those tests, Microsoft gives us a list of areas we need to adhere to so that we get the most out of the product.

Microsoft's boundaries and limits page is dedicated to defining limitations within the versions of SharePoint released. These are best practices shared by Microsoft to give tested areas a maximum threshold for configuration. These tests are done when Microsoft has finished developing the product to gather these points for sharing with the community. These limitations are also valuable to your organization as part of the design and configuration of your SharePoint farm. Communication of these values should be shared with other administrators and users as the items are defined across the board.

Capacity (threshold) limitations are included as part of the boundaries and limits dedicated to SharePoint. Depending on your version, you will see different capacity limitations and available configuration areas. The capacity limitations do give some hard-limit areas and some areas are defined, but you have the ability to go beyond them based on other resources you have defined in your environment, such as servers and other hardware supporting the environment.

Best practices are important to the design of any system as again, they help us provide a stable environment for our users. I can say from experience that not all the best practices and boundaries will be hard limits we cannot go beyond, but they give us a baseline to work from and test in our own environments. In this section, you will see a subset of the list of server best practices I follow when preparing to install the product as part of my assessment.

The reason for defining the best practices listed is that we need to make sure we know the pitfalls as part of the guidance in our assessment. You can describe these best practices as areas you want to avoid, almost like a removed feature in a way. Whether we are looking at our old environment or prepping for a new environment, these best practices will go a long way in avoiding bad situations, configurations, and performance issues.

Best practices can come from Microsoft or other IT technology; as well as these are things we have learned through using SharePoint over the years that have not changed but have stayed true throughout each version of the software, and some new things. Some of these best practices actually void your support for Microsoft as well. You really want to pay good attention to these items and mark them as part of your assessment.

Again, there are a lot more items we can share here, and if you want to review Microsoft's list of best practices, refer to the following link: https://social.technet.microsoft.com/wiki/contents/articles/12438.sharepoint-community-best-practices.aspx#Performance_related_best_practice.

The following is a short list of things I always think about when assessing environments and getting geared up for planning and designing my new environment.

Windows Server and VMs

Virtual Machines (VMs) are widely used as servers for environments such as SharePoint. The hosts, and VMs running on the hosts, are very important to the stability of the farm. These are a couple of things to be aware of when setting up your VMs:

- VMs should never be configured with dynamically configured resources (RAM, CPU, and so on). If this is the case, Microsoft can void your support for the farm.
- Do not clone VMs with SharePoint – they are already installed for a quicker VM installation process.
- Create multiple environments for DEV, TEST, and PROD.
- Make sure to plan for efficient disk space, RAM, and CPU to support the environment.

SQL Server

SQL Server is the core data store for a SharePoint farm. This server should be planned very carefully for performance and redundancy. Please review my short list of best practices:

- SQL Server dedicated to SharePoint only per farm.
- Redundant configuration using Always On.
- MAX DOP setting 1 for all SQL servers supporting SharePoint.
- SQL Server 2016 and 2017 support SharePoint 2019.
- SQL Server 2016 comes with support for SharePoint integrated mode Reporting Services.
- SQL Server 2017 uses native mode Reporting Services only but supports the SQL Server Reporting Services reporting web part and Power BI is supported via an on-premises gateway.
- **Logical Unit Number (LUN)**, which is a drive space that should be created separately for Configuration DB, Service, Search, Content, Secure Store, TEMP and other SQL databases that support SharePoint.
- No third parties or databases supporting other applications should be running on a SQL server supporting SharePoint.
- Configure a maintenance plan in SQL Server to support restoring databases in the case of loss of the server.
- Use a naming convention for your databases (for example, App_
NAMEnTypeofDB_Environment, that is, SP_FarmConfig_DEV).

SharePoint Server

SharePoint is a complex server installation and requires planning and precise configuration. Please review my short list of initial best practices before you start the journey into planning and design:

- 2–3 hard drives for storage SharePoint Server configurations (C drive for the operating system, D drive for applications and install files (optional), and an E drive for SharePoint LOGS and Search Indexes).
- Always provide minimum server resource requirements for all environments.
- Ports for SharePoint need to be defined for communication between the servers within the environment.

- Antivirus exclusions need to be configured so that areas of the hard drive are free from virus protection.
- All service accounts must have names under 20 characters long.
- Make sure to use a separate admin account to install the product (not your personal account) and use several service accounts to define your service application pools.
- Create a farm admins group in AD and assign local admin rights to this group on each server.
- Remember that the farm account only needs admin rights on the server deemed the User Profile Service server and that right can be taken away after the service is started.
- Always use PowerShell to create your farm so that you can name your databases and other resources.
- Use AD groups and assign permissions within the sites for the best performance.
- If doing custom builds of the operating system, make sure you test those builds, doing a full installation before implementing your production farm.
- Always define quotas for your site collections.

I have only mentioned a few things to be aware of in this chapter and have defined many other areas of best practices throughout the book. Some are from Microsoft and others are lessons learned that I follow and have jotted down through my years working with SharePoint.

As we go into our next section, on governance, be aware that all these chapters were put together for a reason. All of these areas outline the pre-installation work you need to do before you design your SharePoint farm. If you move forward without planning and assessments, you will find out later that you totally missed the boat. The problem is, this takes time, and if you want to give your community a great SharePoint service, make sure to follow the guidelines given in this book. I cannot define everything due to the limitations I have on pages in the book, but this will point you in the right direction to have a vision of how you should be implementing SharePoint for a new or migration project in the real world.

Governance

A challenge for companies today is deciding who owns the collaborative and social environments in our company – is it IT or the business? In the case of collaboration tools and social tools, it's the business, as IT is only a part of the governance stakeholder community. SharePoint is included due to how widespread the data that could be included in the content on-premises and on the cloud. This reaches across mobile, desktop, and web platforms presented to our employees every day.

The other challenge is managing those available apps and enterprise solutions and bringing the best solutions to our customers and departments within our entity. We should never go into any project without first seeing how it reflects on our enterprise and the data that is presented in that solution. As stated, if you miss the mark on governance, you will fail the implementation.

As part of our environment assessment in this chapter, we need to take a look at governance policies and standards to support our current and or newly implemented systems. When creating and implementing any new application systems within your enterprise, you need to provide policy guidance around the system to support it using policies. This would include actions such as content updates, role assignment, branding, and even training, as a few of many examples. The support of any system can be easy to complex, and for that reason can stretch over many areas of management.

The areas of support included to be defined are as follows:

- Define technical management.
- Define policies and standards.
- Define guiding principles.
- Define features and web parts.
- Define site deployment and management.
- Define customizations and enhancements.
- Define site and system security.

To provide the best policies and standards to support our new or changing system, we need to include all of the areas mentioned. To support these policies, we would look to governance as the mechanism to provide a composed list of system rules and policies to be established within an organization. These policies would bind to a system or application, and/or standardize these areas from a global perspective. Each can bring an individual scope as well, in which a unique policy standard may be required depending on that application's requirements.

This system of rules known as governance should meet the requirements of the users while keeping administrative and managerial control of that data for compliance, policies, processes, and all associated content. Included in this process is the process to check that the appropriate systems run appropriate applications on their platforms and also give the users on the board the ability to choose the right policies for the applications being developed.

Governance of systems in your enterprise is needed to support applications and processes that bring insight into ultimately all company data. With governance, you can define where content lives, define shared policies across applications, and create policies to protect those data areas. Since this is a centralized process and governing body, you will also catch projects of the same outcome where you can recommend centralizing some applications for different departments in your organization. This will help not to replicate systems of the same kind but to use already developed platforms that can be repeated within the organization to save money.

Stakeholders

The governance rules are created by a team of stakeholders within the company in which everyone provides input to build individual policies that can be related to a certain application or broad policies that affect all applications for individual or multiple platforms. Rules are also created by a host of different stakeholders. They could range from top management personnel to users who actually use the applications within the environment. These rules should be implemented by this team or teams every time a new application or system is requested.

The reason we want stakeholders to come from different areas of the company is to provide different perspectives from all levels of management, the user community, and senior management. This helps to provide total coverage of ideas and a variety of issues that can be recommended to help prevent areas of the applications that may not affect those unaware due to the level of involvement.

As these policies and standards are being created, they also need to be communicated to the user community. With regard to that, I have seen a formal list of applications on intranet sites that were relayed by management but when assessing the environment, there were many other applications being used in the enterprise that were not approved for use. The confusion started when SharePoint was initially released, as no training for the users was given. All users interviewed had many things they could use SharePoint for, but did not know how to create those applications.

This left a big collaborative asset within the enterprise that got no use and was deemed an unusable product. Users were convinced that SharePoint was very hard to use and there was no hope for the platform. This started a revolution of all of the enterprise users and their management to find easier ways to do their work using mobile applications that most users needed for the same issues. You can see, even in this situation, how important training is to users when releasing a system, as well as how governance could have weighed in to solve common application requirements and prevent these rogue applications from being used.

Why governance is important

As a traveling engineer who has visited and spoken to well over 100 customers for SharePoint-related projects, I have noticed that most companies do not implement governance. This is something I find concerning, which is why I have included this as a section in this book. I cannot stress enough how important this process is to a system as sophisticated as SharePoint and other collaborative systems and apps. If you have not implemented a solid governance plan with the new addition of mobile apps and desktop changes due to cloud applications, these need to be looked at now.

The new age of apps and other mobile applications brought to the playing field has really made governance a challenge in enterprises. Compromise of this mobile data could happen because mobile platforms stretch to a wide audience and these apps can also be used from private computers that are secured by home users of these applications. This information is also not governed, which gives the opportunity to share content with a wide audience. If the user is not governing the associated apps, along with the device, and providing security standards, we do not know how data is being secured through these devices. In the event of a device being stolen, we have no idea what data could have lived on the device.

Mobile apps leave a big hole in our control over information and how it's being used within the organization, and now with the cloud, even outside the organization. Using mobile apps leaves data out of the control of the company and intellectual property unmanaged. Internal secrets can be compromised and shared with competitors if these companies that provide support for the apps are compromised. When data isn't centralized and controlled using a centralized security method, data is unable to be secured properly and unable to be shared within the enterprise. Having data centralized or spread over different platforms with policies and standards gives us more reporting capabilities and the ability to set policies to hinder the users of data inside and outside the organization.

In the cloud, we also have hybrid connected SharePoint on-premised environments and OneDrive, which also bring a new element of governed content that crosses networks. Each system has administrative controls, but some of the controls in the cloud are not in our hands. Policies for these types of connected data repositories also need to be considered in our governance document, as well as data compliance and security across networks.

Determining an approach

With systems such as SharePoint, you could have enterprise implementations of SharePoint that have been used for many years and those that are just getting started with the implementation of the product for the first time. If you are in the situation of having a system in place with no governance, it's time to get started. If you are starting fresh, it is also time to get started.

Do not release without governance or a plan in place for a SharePoint environment. SharePoint as a product has many areas to be concerned about for governance stability and the stability of the product. It was created to give users more control of their daily requirements, such as security and other ways of sharing, but can easily get out of hand if you do not provide policies and standards for this environment.

In the next section, we will go through some of the areas of concern and get you started with creating a governance plan. This process takes time and should be factored into your project. Although it is one of many areas of concern in your planning, some of these items can be determined while designing the system. The documentation that needs to be produced during a SharePoint implementation can be time-consuming but it is needed to really build this platform on a solid foundation.

Creating a governance plan

When creating a governance plan, there are a few things that should be included. In these times of additional mobile apps and other integrations between collaborative applications, we should not just be looking at SharePoint. SharePoint could be a big piece of our enterprise pie for collaborative applications, but there are other applications that bring value to our enterprise as well. Including overarching guidance for all governed collaborative areas actually makes sense because they all work together in some way, shape, or form.

When looking at our collaborative environments, we take the biggest piece and build around it. Collaboration can be made up of a centralized solution and many other small solutions that make up a total solution. All solutions will have different governance plans but can be built to integrate those areas related to others, which is what collaboration is. Creating this document is very important and I cannot stress enough how far this dictates the success or failure of a collaborative project.

The following are some guidelines on how to create your document and some high-level details about each area.

Vision statement

Using a vision statement in your governance document describes overall what you want to achieve with SharePoint or any application you are preparing this document for. This document should bring high-level details about the guidance provided within this living policies guide. You should make sure to make your vision statement clear and provide choices and critical guidelines that will be documented here. Again, this document is living and will always change. Keeping ongoing versions of this document is critical to the life cycle of governance in the environment you are writing it for.

This vision statement and details should be shared on the intranet for all users to see. This gives a way to communicate to the whole enterprise and not just SharePoint users.

Roles and responsibilities

Teams, as stated in this section, should be created to manage this document and the governance of any given application. The team can be the same team for all projects, or you can create different teams as needed to support your environment. Having many teams creates diversity and brings more ideas to projects that are in play.

Training also comes into play as these roles are defined, especially when implementing a new or updated software application such as SharePoint. You want to make sure your farm administrators, site administrators, and users get trained on the latest and greatest version of the product so that they understand how to use it before you implement it.

Microsoft has lots of help when it comes to training and getting the help you need for the communication of changes coming to the environment. Please review your Microsoft licensing and have a meeting with your technical account manager to figure out some of Microsoft's freebies and some other cost-effective ways to help you prepare your admins and users.

When looking at the roles, we can see that depending on the size of the project and integration points, there could be more roles needed. Examples of roles are shown in the following table:

Role	Key Responsibilities
Executive Sponsor	Manager is responsible for the solution and is the go-to person when it comes to pushing the agenda of the solution to others in management across departments in the enterprise.
Governance Board	This steering committee would be the governance team responsible for meeting the objectives of the solution. This board comprises of representatives of each of the major businesses represented in the solution, including human resources, communication areas of the company, and IT.
Business Owner	The business owner is the functional designer of the solution and works to make sure that the functionality needed is communicated to the groups. The business owner also does not have to have an IT background as the communication is from a user perspective.
Solution Technology Administrator	This administrator works hand in hand with the business owner to support the functionality and design of the solution from a technical standpoint.

Figure 1.4 – Roles and responsibility

Site collection roles are advised to be implemented as part of governing the sites from the top level. Site collection admin groups are used to create a top-level administrative group for each department or however your sites are distributed:

Role	Key Responsibilities
Site Sponsor	The Site Sponsor role is in place to manage the design and content of the site collection. This role is also responsible for making sure links, web parts, and other designed functionality are in place and working as they should.
Site Admin	Manages site security and day-to-day activities. These include security, retention, policies, data compliance, IRM policies, and content tags used within the site that create search results and or data hierarchies.
Site Designer	The Site Designer role is to make sure security policies are working and make sure that features that are being used work as expected. The role is in place to keep the functional areas intact.
Users	A user has access to the solution to access and share information. Users may have different access permissions in different areas of the solution. They can sometimes act as a contributor and other times acting as a visitor.

Figure 1.5 – Site collection roles

Utilizing a team is important to bring clarity as different ideas are shared to support a project and create policies around content. In governance, roles are always needed to make sure that a hierarchy is in place for those roles and the access they are provided. This also is true with securing information in sites that users access once the platform is available.

Guiding principles

Most companies in their vision of web content have preferences that outline best practices for all users and site designers that they will have to adhere to and understand.

Guiding principles define a company's preferences and support the vision and goals of the company. The critical statements that come out of this exercise best reflect the company's outlook and include best practices that all users and site designers must abide by to ensure the success of the company's implemented solution. It is common for your organization to share many of the same principles that I have seen in successful SharePoint deployments, which would include best practices from Microsoft. In some cases, you may deviate from those best practices, but for the most part, you will include a good majority of those common goals with the implementation.

Policies and standards

Policies define rules around content and use, which can be described as standards within SharePoint. Users are expected to adhere to policies without diverting from these policies. Governance policies are defined and usually driven from statutory, regulatory, or organizational requirements. These standards are set in place to encourage consistent practices. Users can adopt some standards to help define their content depending on the implementation and requirements.

When looking at standards, let's take an example: in a case management requirement, one of the key fields may be a case number. This number may consist of parts of a name and sequential numbers keeping cases in order, or there could be a different approach to this field requirement. All the policies and standards we are after define what this case number will be every time it is assigned and should not have many deviations from the standard once it is set.

Another example could be a branded page with web parts in a certain layout. This could be a standard for the company, but different departments may have wiggle room to change the layout but maybe not the colors, or maybe they are allowed to use a different logo on the site depending on the department. These types of standards need to be discussed as part of our governance process based on the project we are working on.

Content policies and standards

Create a list of policies and standards you will require when users and administrators create content within the SharePoint sites. These policies and standards control how content will be created, who has ownership of the content, and how the information should be managed. Publishing features are also addressed in this section if you plan to use publishing as a way of controlling information posted within the sites.

Creating subsites

When end users have control to create their own content within a SharePoint site, we have given them control to build their own content hierarchies. We need to guide users on best practices when giving them free reign to organize their content. So, in this area of your governance plan, you want to set standards on the areas that are affected by users when they do create new subsites.

They should make sure to set the following:

- **Content ownership:** Provide a content owner who has responsibility for the content and make them aware of any other governance practices related to their job.
- **Security:** Provide security for the new content and create new security groups when needed for highly sensitive information.
- **Content administration:** Someone should be managing the information and making sure that current and new sites are backed up and have the ability to be restored.
- **Navigation:** As information gets added to the site, make sure to not build deep hierarchical content within the site and keep the information easy for access by other users.

Posting content

When posting content, we want to make sure that documents and content posted to the site are not duplicated. There are features within SharePoint that can help with this, but ultimately, this is the job of all users. Duplicated information adds to your content size, especially when documents are concerned, and can also confuse users who may not get the latest version of a document with relevant information.

The site sponsor is ultimately responsible, but users are responsible as well. As a team, everyone should be working to ensure that posted content is accurate and complies with policies that are put in place for record retention.

Things you can do to define these types of policies are as follows:

- **Content cycle for posting:** Updating and validating content should be an ongoing cycle performed by all users. Deleting content that is stale or moving content that may have reached a cycle of completion could be a sign to move it using retention policies.

- **Content formats and naming conventions:** Some content, such as documents, may require templates to make the record a valid record. Naming conventions also weigh in as naming documents in certain formats may be a requirement by the sponsor.
- **Content that contains links:** Define responsibility for who should update links within documents to make sure that the links are still valid.

Content types and metadata

Content types are collections of settings or form details that define information within SharePoint lists. These collections can be used for gathering a collection of data from users or in a project plan. Content types can be defined for the entire enterprise or a site collection. Typically, these collections are used in local pages or sites. Site columns are referred to as property and can be a part of any content within a site as these are defined at the top-level site collection. Both are used as metadata to describe the content within a particular list, library, or even other content.

Managed Metadata is a similar collection of settings as well. This is centrally located on the farm, so all users can access it, and since it is centralized, the management of these terms is easier to keep organized. The metadata can also be segregated as well but this gives SharePoint owners a way to define how data is searched and presented.

In these cases, we need to include policies and standards related to these areas. These would need to be communicated so that users can request to create new content types and site columns, and manage metadata to support their project.

Social tags and ratings

Social tagging in SharePoint became popular in version 2013 and was new in 2010. These capabilities allow users to participate and interact with your SharePoint solution and improve content searchability. This feature allows users to tag information, which then classifies that information within the site that the user finds meaningful to them.

With all social capabilities, you should make sure your users understand the social tagging functionality and how it's used in the search index to provide security trimming. Security trimming provides access to information that a user has access to. If you do not have access to content, you will not see it in search results.

Content auditing

Within SharePoint, there is the ability to audit content changes. You should consider a policy to define a review process of sites and even types of content. Content that is available to all users in your company should be governed using a content management process. This process is used to ensure true, trusted, and vetted content is being displayed to users. The review process should be as frequent as you need but shouldn't be longer than a 1-year period.

Records retention

Records management is becoming a big deal in the SharePoint world. I see a lot of information on these types of solutions popping up everywhere. In the governance of these types of solutions, we need to create clear, defined policies on how records will be used within your solutions. Codes for records should be used to identify content as a record. You need to choose the appropriate method to apply records management policies, which is especially useful because this dictates how users find information as well.

Data compliance

In the latest versions of SharePoint, data compliance has come to the forefront. There are built-in compliance features for administrators for server roles and services. There are also compliance site collection features we need to create policies and standards around as well. These site collections have areas of automation that can be configured to help manage compliance and send notifications on faults with content within our sites. Policies and standards should be created to manage what constitutes a violation of data and what type of data should be protected.

Business process workflow

This is one feature in SharePoint that is getting used more and more within companies. This feature really needs oversight as well as guidance on how workflows should be created. The other side of this is reusability. If a standard workflow has been created for the approval process, then this workflow should not have to be recreated. We need to put in checks and balances as well to make sure we are not recreating the process and wasting developer time. Make sure to set policies and standards on the creation of these processes and provide guidance on what is considered a business process. You don't want to create something that really isn't needed.

Page layouts

Page layouts are very important to present data to your users. Users can easily get confused from the visual layout of a page, especially when data could be in no organized manner. All users with permissions to change and add web parts should be familiar with design and usability best practices.

Branding

Most organizations brand sites to give a look and feel based on the colors and logo of the company. There are sometimes different departments that would like to project a slightly different appeal to their entity within the company. In this case, there should be policies in place to consider slight deviations of branding for these reasons. We also want to keep in mind that users also want to know where they are within the site as well. For these reasons, we need to be careful about how we brand our sites and what we approve as part of our look and feel. Define standards and policies to help guide the branding within your company.

Blogs and wikis

Using blogs and wikis can result in posting wrong information or information that needs approval. End users should be aware of your organization's policies around posting content in these areas. We need to ensure we are not being too restrictive but have checks and balances around this information to ensure the responsibility of the content owner's published works. Consider creating policies and standards around any information published for use within SharePoint.

Announcements

Using the announcement web part to relay information to your users is very useful as a SharePoint feature. With that, we need to make sure the information is projected well and is precise and descriptive. The title and announcement text should encapsulate all that needs to be said within a descriptive title and no more than a few sentences. We should avoid large fonts and not create emphasis on words using italics or underlining.

Picture and video libraries

Picture and video content is very popular now. We see more and more of these files as these types of content become more needed. The size of these files can be very large as well, which brings a new element to how to structure our databases and where we keep this content. There should be policies around types of files, size of files, and types of content, which should always be business-related content. We should also have policies around the ownership of images as well and how we copyright those images created by our users.

Links

The site designer will need to review and edit documents and other content to make sure that links have the option of opening either in the same window or in a new window. Also, there should be policies for links within documents, pages within the sites, and links that go outside to your intranet.

Content-specific guidelines

To really impact your community with accessible content for the end users, we must make content easy to find but also structured. 508 compliance also comes into play because not everyone will have the ability to access content using formal methods. These policies for easily accessible data will include those areas that will be addressed by tagging content. Accessibility is important and is not always a thing we talk about or put a lot of effort into. This is due to the vast majority of our users not usually requiring accessibility features. There are many things we can do to help those who cannot easily access data in an out-of-the-box format. Third parties and other manual ways of including all users can be achieved using these methods.

Security

Security is one of the most important design elements in a SharePoint site. When you think about security during the design process, make sure you understand how content will need to be secured in the site as this will affect how the site is accessed. Site structure and page layout could be affected due to this important element.

It is important to ensure that everyone who has permissions to assign security roles understands how SharePoint security works and has had some type of training to ensure that company policies are followed, especially with the introduction of the cloud and hybrid connectivity.

There are options to create security groups using AD and SharePoint. Users would need to understand when to use these different groups and why they are being used. Please make sure to define policies around your content clearly so that everyone understands how SharePoint security works and understands your policies and procedures.

Training

When it comes to governance, there could be a big learning curve as some users may have never been a part of a process like this before. This brings another area of concern, but you do not want to turn away those that are deemed as part of the team due to this issue. I know of training centers that key on governance as a topic of choice but you can also talk with Microsoft to help you work on your governance plan as well as training those who will be part of the team.

Training for governance is too important to miss! To get the most out of the personnel you select as part of this process, please train your staff to understand what the governance plan is all about.

Summary

Understanding your environment is very important before starting a new installation or upgrading a project to a new version of SharePoint. Again, make sure you know all the deprecated features, new features, boundaries and limits, best practices, and governance. All these areas need to be investigated as part of an assessment to figure out what areas need help in your current environment and what areas are changing.

Remember to document all areas of your environment if you haven't already. It is very important to understand your position. Along with documentation, governance is a very important part of the implementation process and if you do not have this in place currently, make sure you do it now. Please take my advice and implement governance in your SharePoint enterprise. Do not let this slip through the cracks and do not release your environment without it. I have seen too many environments fail or have daily fires because of governance not being implemented.

In the next chapter, we will start to plan our project by reviewing our current architecture and server roles within the environment. Along with that, we will start to look at some scenarios and focus on where we are and where we need to be by the end of our project.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. A removed feature is unavailable in SharePoint Server 2019 but is available in older versions of SharePoint. True or False?
2. When migrating from SharePoint 2007 using a deprecated migration tool, new and removed features don't matter to your project from these older versions: 2010, 2013, or 2016. True or False?
3. In SharePoint, governance provides security and farm topology aspects for the project. True or False?
4. Microsoft best practices can change based on the version of SharePoint you are using. True or False?
5. Boundaries and limits are a list of limitations on features that are distributed by Microsoft but have not been tested for accuracy. True or False?
6. VMs can run on hosts in your SharePoint environment using dynamic memory allocation as a Microsoft best practice. True or False?
7. SharePoint training for users is needed to support upgrading to SharePoint Server 2019. True or False?

2

Planning and Architecture

When planning SharePoint architecture and solutions for an enterprise, it takes time and patience to achieve successful requirements that give defined goals and time-frames. During the planning phase, there will be many documents that will need to be produced. These documents will come from the following areas:

- Assessments
- Design
- Research
- Needs
- Use cases
- Project resource scheduling

The planning of tasks also gives metrics on the time to complete them, which involves project milestones and start and end dates for targeted deliveries. This planning will encompass all time-related information needed to move the project forward at a steady pace.

Designing architecture for a SharePoint enterprise requires different resources and is based on a technical set of requirements. These can be found in the new and deprecated features, removed features, and any gathered data provided during the assessment of your current environment that we completed in the previous chapter. The design encompasses detailed information about the network, server platform, SQL and SharePoint configurations, and any area of IT that is configured during the installation and configuration process that will support the product life cycle. This design document should be a living document as it also provides details on those areas for future reference and can be changed as needed when changes are made to the environment to include future changes made to the architecture.

In this chapter, we will cover the following topics:

- Planning – overview
- Planning – how to find the best architecture based on requirements
- Planning – cost of your environment
- Planning – resources
- Planning – SharePoint farm design

You will learn in this chapter how to plan and prepare for a SharePoint implementation. This task is very detailed and there are varying reasons why this is the case. There are many areas to cover to make sure you get a clear understanding and successfully implement a project of small to large size. You will also learn how to manage costs and resources and how to design your farm based on company security and requirements.

Technical requirements

For you to understand this chapter and the knowledge shared, the following requirements must be met:

- Current admin experience on SharePoint farms 2007, 2010, 2013, or 2016
- Current enterprise experience supporting a collaborative user community with SharePoint
- Project planning experience related to SharePoint
- You must be a SharePoint power user

Planning – overview

Planning a new SharePoint environment or a migration from an older SharePoint environment requires us to define future goals for collaboration solutions within our enterprise, as well as research to provide clear requirements and project schedules. Whether it's SharePoint or other collaborative applications, planning to add additional systems to your environment requires great insight. This requires attention to detail and building teams that can do the work to support the scheduling and delivery of the application.

For the record, I am not a project manager in any light but I understand what things should be identified as specific to a SharePoint implementation project. It doesn't take a PMP certification to understand the tasks and timelines needed for a successful implementation. These certified project managers look at these tasks differently from architects and measure against them using other mechanisms. In this planning chapter, I am just going to touch on the areas needed to help you as an engineer or architect understand your responsibilities and what areas need to be concentrated on as part of this process from an IT standpoint.

SharePoint is often a huge piece of the pie or central focus for many enterprise collaboration environments. There could be other cloud apps or large applications that play a part as well, but in this planning exercise, we will concentrate on SharePoint with some caveats where the integration or confirmation of other applications needs to be present in our plan. With SharePoint, there could be integration with the cloud or other Microsoft communication platforms, such as Teams, Skype, or OneDrive, which could play a part in how fast we can provide our environment to our user community. This may also require a different team or consultant who may be providing those services.

As you saw in the first chapter of this book, we assessed our environment, new features, and deprecated features, and did an overall assessment of our current state, be it new or already in place. In our planning process, we will use those documented areas to determine what needs to be completed to finish our project and what resources we may need to do so. We will also determine the time it will take based on these assessed areas by using the data to figure out what tasks are needed to complete the project.

These tasks could range from reporting or the clean up of our old environment to working to create our new environment. Some of our tasks could even relate to our last SharePoint project and the requirements will remain the same or look very similar. If you have an old SharePoint project plan, you can use some of those areas in that plan for a new project for SharePoint Server 2019. SharePoint at its core does not change, as you will see when we install a VM and host servers. Most of everything you have done in the past you will also do now. You will install SQL Server and SharePoint, which works very similarly to in previous installations. This can be said about every SharePoint installation we have installed since SharePoint 2007, with the exception of those environments where SQL Express was used for a single server installation, as this is not supported in SharePoint Server 2016 or 2019.

Goals and objectives

As part of our goals and objectives for our SharePoint project, we should proceed to start our planning by finding out the goals of the enterprise solution from a company standpoint. We want to make sure to understand how, as a company, they would like to use this collaborative environment to support the goals of the company. We also want to find out general information supporting the project, which would include information such as funding, completion expectations, and any other details related to the project.

This project will take a team effort as all requirements and tasks may not be specific to a central group. Coordination of these efforts is very important and should be completed before you start on any project, especially SharePoint projects. During this project, you will have internal meetings with many different teams supporting the project individually and collectively. This would include all external team representatives from the different specialist areas, such as **Active Directory (AD)**, networking, database, server, governance, management, and user community, and whoever is a stakeholder in this implementation. These teams will need to be assembled, which would be a requirement before starting any technical configurations.

There could also be other projects in progress or in the planning stages that relate to your SharePoint project. This could mean integration points and/or other types of intercommunication that would need to happen to make sure your project is successful. An example of that could be an AD restructuring project. AD would be required to be completed before SharePoint could be installed and configured due to the fact that AD is the method of authentication needed for users and service accounts to be functional. AD restructuring, be it on-premises or on the Azure cloud, as a project could put our overall project on hold because identities needed for administrators and service accounts would not be able to be created. The reason AD restructuring is important is there could be a change in the domain structure or we could be upgrading to a newer level of server, cloud, or integrated authentication method, such as SAML. This could delay your project if you are bound to using this new AD structure.

One of the goals we need to understand before going forward is to determine the architecture and the reason SharePoint is being implemented. The architecture is important because it drives our cost, which also drives what resources we need to support the environment. As part of our assessment, we found out things that we need to change within our current environment and things we need to bring to the table to support our SharePoint 2019 environment. Let's take some fake data and make some determinations from that data to create some architectures to work with.

Planning – how to find the best architecture based on requirements

Planning an enterprise SharePoint farm takes a lot of work. Do not skip the planning phase of your new farm as it will have consequences later during your move to that environment if you are not careful about doing some upfront work. The following exercise examples are based on existing company infrastructure and an acquired company that is merging their SharePoint into your new environment. In the exercises, we will go through some basic examples of how to identify the required architecture and configuration based on different versions of SharePoint and different farm configurations. These exercises will help you to figure out the necessary changes to your new environment and give you recommendations in those areas.

Exercise 1

The current SharePoint 2013 farm architecture used by your company that was assessed is structured as follows.

The architecture is as follows:

- Two web frontends
- One app server
- Redundant database servers (two)

The license details are as follows:

- Windows 2012 R2 Standard: Two CPUs, 8 GB RAM, C drive = 60 GB, E drive = 60 GB
- SharePoint 2013 Standard: Four CPUs, 8 GB RAM, C drive = 60 GB, E drive = 60 GB
- SQL 2012 R2 Standard: Four CPUs, 16 GB RAM, C drive = 60 GB, E drive = 60 GB, H drive = 2 TB, L drive = 500 GB
- NLB load balancing
- Two virtual server hosts: Eight CPUs, 96 GB RAM, C drive = 120 GB, E drive = 2 TB

The content details are as follows:

- 1 TB of data
- No custom applications
- No third-party applications
- File size max: 2 GB
- Claims authentication
- Supports 3,500 users

In our current company's configuration, you will see in the following diagram that we are lacking coverage for all the tiers within our design:

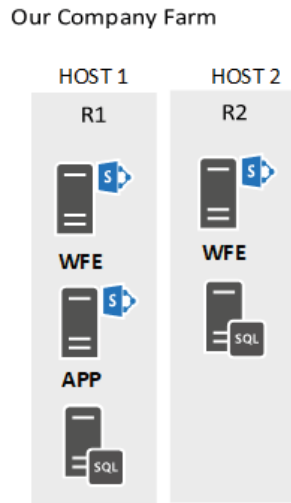


Figure 2.1 – The company's farm design

The acquired business's current 2010 farm architecture used in these exercises is as follows.

The architecture is as follows:

- Two web frontends
- Three app servers (one server dedicated to search)
- Redundant database servers

The license details are as follows:

- Windows 2008 R2 Enterprise: Four CPUs, 8 GB RAM, C drive = 60 GB, E drive = 60 GB
- SharePoint 2010 Enterprise: Four CPUs, 8 GB RAM, C drive = 60 GB, E drive = 60 GB

- SQL 2008 R2 Enterprise: Four CPUs, 8 GB RAM, C drive = 60 GB, E drive = 60 GB, F drive = 3 TB, L drive = 1 TB
- Hardware load balancer
- Four virtual server hosts

The content details are as follows:

- 2 TB of data
- Four custom applications
- One third-party solution
- File size max: 2 GB
- Scan to SharePoint capability
- Classic authentication
- One web application with forms-based authentication
- Supports 6,600 users

In the following diagram, we can see that there are four hosts and VMs are dispersed across the hosts for the best recovery and stability of the SharePoint farm:

Acquisitioned Farm

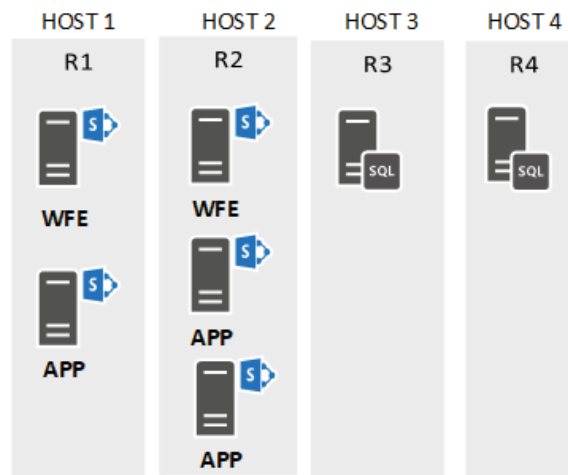


Figure 2.2 – The acquired farm design

Let's look at some scenarios to gain a better understanding of how we can plan our architecture.

Scenario one

In our assessment, we found that we currently support 3,500 users running SharePoint Server 2013 Standard and the company is planning to grow to 5,500 users by the end of the year due to an acquisition of another company. SharePoint adoption is low at this point at your company but the company you acquired uses SharePoint 2010 Enterprise heavily, using **Key Performance Indicators (KPIs)**, SQL Reporting Services, and Power BI. Your management plans to adopt some of their business applications for use within your business processes. Your management would also like you to take into consideration that as the company grows with this acquisition, the understanding is that this will bring more customers, which then brings more revenue for the company. This will, in turn, create more jobs and more users to support the enterprise.

Recommendations

In this situation, we have many things to look at from a planning perspective. We need to take into consideration our environment, the acquired environment, and our move to SharePoint Server 2019. Some of the big things that jump out to me in looking at the requirements are that we have a 2010 Enterprise environment and a 2013 Standard environment. This means we need to make sure that our SharePoint 2019 environment supports the applications developed in the acquired SharePoint farm. This would mean upgrading the SharePoint environment from Standard to Enterprise as well as upgrading SQL Server to Enterprise level. In this case, we would also need to upgrade our Windows operating system to Windows Server 2019.

Authentication stands out as well as we have both farms using different authentication methods. This would need to be resolved as part of the integration of both farms into a single farm. The acquired farm could be using classic authentication, which is obsolete and not supported in SharePoint 2019. The course for upgrading from classic to claims would be to migrate the users over in that environment using the original AD domain. Once the authentication process is completed using PowerShell, we would then migrate the content once it had been updated to claims authentication. Testing this process in your dev and test environments first would reveal any troubleshooting efforts you may need to make before trying this in your production environment.

The next recommendation in planning for the new farm is we would need to resolve areas of the farm architecture that will not support the users from a service standpoint for redundancy. The architecture is also not built for growth as the company could bring on more users in the next year due to the acquisition. In this plan, we need to make sure we can accommodate the new users that come on board, which means we may want to add one or two more web frontends. Adding one would be ideal, but when you have three, it gives you flexibility when doing updates to your servers as there are always two more available to handle the load. We also need to think about MySites and how we approach that configuration. We should look at using OneDrive as our target if no applications are being run against files in SharePoint currently.

When thinking along the lines of redundancy as part of the solutions, we also need to find a new way to support our load balancing for our web frontends, which is more reliable and doesn't take away from our web frontend service performance. We would need to look at a hardware load balancer at this point and maybe even hire a person to handle this from a technology perspective if you do not have someone in-house already. This is very important as you add more users to the platform and spread those users across two or more servers to handle the load. Power BI and other data-related services will need to be considered as well as these could give a much more intense user experience and workload on the web frontends.

There is also the need to redefine the number of hosts that support the VMs in your environment. Currently, we have two hosts with four servers, which provide no redundancy for each area of our platform. In our platform for SharePoint, you will see that we can mock this up with MinRole, as seen in this diagram:

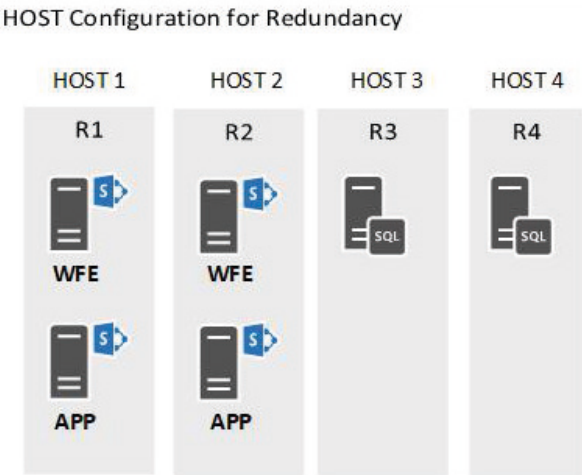


Figure 2.3 – A mock-up in MinRole

When following some host best practices, you can see that we need to create redundancy from a host perspective so that if one host server is lost, we could still be somewhat effective at keeping the service up and alive until that host server is brought back online. There are other tools available as well for the cloning and duplication of VMs, which can be considered as a partial solution.

When cloning and duplication tools are used, these tools can help with duplicating servers. One thing to mention is SharePoint doesn't like servers to be duplicated or cloned because of the complexity of the farm/server configuration, so there would be no way to capture the total configuration of a server without some deep recreation and manual steps. It's best to keep servers on standby that are already in a warm standby state. These servers should be part of the farm or at a state where the operating system is installed and configured and SharePoint is ready for connectivity to the farm. In these situations, third-party tools can come in handy, as you can use them to recreate your server farm from scratch – I specifically refer you to AvePoint's tools. At this point, we would install the server as usual with a new server name and configure the server quickly using PowerShell or AutoSPInstaller.

To provide support for SQL Reporting Services and Power BI, which is non-existent in our company farm but does exist in our acquired farm, we would need more server power to support these services, as well as a plan for the installation of these integrations for the farm. When looking at our new features, we can see that SQL configurations have changed in support of SharePoint Server 2019. This would mean that you will have to understand which version of SQL to use (2016 or 2017), which was mentioned in *Chapter 1, Understanding Your Current State*. Plan your SQL supported services using the information in the new features area to make sure to architect your solutions based on a new configuration.

Scenario two

In our assessment, we found out that we currently have authentication concerns. Each environment acquired and our company farm support different authorization methods. We also noticed that both environments are currently using separate domains and neither one has trust between them. Both domains are using AD for user login but the acquired farm is also integrated with SAML for authentication within the enterprise.

The acquisition farm uses custom code within the farm to support user profiles. The custom code brings in user identities from the source of employee profiles instead of AD, which this code is established on one server in the farm. We need to find out how we support AD, SAML, claims authentication, and services for user profiles going forward in SharePoint 2019.

Since we are on SharePoint 2010, shredded storage has not been introduced. So, the size of your overall content is one to one. So, if there is a 2 GB file in a library, all versioned documents are 2 GB as well. Once you migrate to the newer version of SharePoint, these documents will change in size if you use a migration tool. If you are using content database migration, these documents will stay the same size in the database and will not change until you start adding versions in the new 2019 library. Once you start using shredded storage, you will see a dramatic decrease in document sizes and storage being used in site collections.

The need to check the sizes of your content databases and site collections is so important as you should have been managing them as you managed your current farm. Some of these databases could be over the best practice limits and may need to be broken up, or site collections may need to be moved to a new content database. Shredded storage will play a part in this as well once you get over to your new environment if you are on an older version of SharePoint. You will see some dramatic downsizing in your file sizes for versioning.

Note

Make sure to examine some of your data within your libraries. I had one customer who had one Excel spreadsheet that was set to have unlimited versions in SharePoint 2007. When calculating the size of that one file, it came up as a 20 GB footprint in the content database. At this point, with all the versions of this document over the years, they limited the versions and saved over 18 GB of storage on *one file*.

Recommendations

There have been a lot of updates to the SharePoint architecture in the last two versions of the product. As for authentication, SharePoint only supports AD out of the box as of SharePoint 2016 and 2019. This change really limited what authentication methods could be used to connect to SharePoint. Since we already have differences with user accounts using classic and claims identities, we would need to fix that issue first as stated, and then figure out support for SAML. Forms-based authentication is still supported in SharePoint 2019 and is still configured pretty much the same as it always has been.

Microsoft provides a product that gives a solution for these types of issues and integrates with SharePoint seamlessly. Microsoft Identity Manager supports authentication stores that are outside of AD. This server would need to be built and configured to support a final configuration for SharePoint 2019. Migrating to SAML and using PIV cards is a project you would want to plan out thoroughly with a lot of testing.

With this type of security, an **Active Directory Federation Services (ADFS)** or trusted identity provider will come into play, and the ADFS server will be needed for the users to authenticate properly. ADFS is a server that gives access to sites within SharePoint for external access. There are other providers, such as Okta, who also provide these services in the cloud in which the integration is a solution and PowerShell would be used to create realms and connectivity to Okta for authentication.

You can configure this integration after you go through the process of implementing the new farm. This would need to be tested in a lower environment, or even a separate environment, before implementation within the production environment to make sure the authentication works as it should do based on your requirements.

There are many scenarios we can go through with this assessment data but I wanted to point out some obvious details to get you thinking about where you are in your planning and how you can start rebuilding your company's SharePoint environment with Server 2019. Please make sure that you have checked under the covers of every configuration, content database, service database, service, **Global Assembly Cache (GAC)**, and site collection with the utmost granularity. The last thing you want is to be blindsided after your move to the new farm.

Looking at these scenarios gives a sense of what things we need to be aware of to support our environment. Essentially, the standard for a web frontend configured with Microsoft-recommended resources can support up to 15,000 users concurrently. This means that you need to understand your community and how many users you will be supporting with your SharePoint services. If you have more than that number of users, you will need to add web frontends and use a load balancer to distribute traffic between them.

In doing this analysis for web and app tiers, you will notice a cost associated with the hosts that will support your server VMs and costs for software and other incidentals, such as third-party solutions. You would also need to include outside network hardware and software needed for load balancers and other interfaces that may be required in your environment. As you can see, costs will add up.

In the next section, we will talk about costs and how these costs can be lowered by solutions and other known recommendations we can show to help you create a shopping list to get started with. Once you have really gone through your planning process, your shopping cart will be completed and you can order equipment and other software to help get ready for your installation. Right now, we need to make sure we are thinking correctly about what we are building and what we need in place to support our services.

Planning – cost of your environment

We have seen how we use our assessment data to figure out the options to move forward with for our implementation. With those collected details, we need to examine them thoroughly so that we can architect our new farm. Since we have some details that will continue to be defined as we go through the project on how we move forward, we now need to take cost into consideration. The cost will not be your area of expertise because we, as technologists, want the biggest and the best technology to work with, but with feedback from management, we can look for solutions to support our dream environment while still saving money and getting the same stability with other products and services.

Management, however, will be looking at these numbers to make sure they fit within the company's budget. You can get some numbers from them to make sure you are totaling close to where they want to be with hardware and software costs. There needs to be an understanding and an explanation of the new platform so that management understands where the costs are coming from.

As an example, you may add a third-party tool as part of your needs assessment to help you with **Remote Blob Storage (RBS)**. This solution can be beneficial in a lot of ways that management may not understand, and they may question why you are purchasing this solution. So, we must help management see the big picture of the architecture, which can help you with your case to receive more money if needed so that approvals can be given for your architecture.

While we can be looking for ways to find savings in our project, we know first off that we have little or no choice in using Microsoft platforms in almost all cases, especially SQL Server. There really is no way to leave Microsoft per se, because we know everything is built on Microsoft's platform that supports SharePoint. If we look at this with our eyes wide open and examine the new features mentioned in this book, there have been some big changes with SQL Server 2016, 2017, and 2019. We may be able to take advantage of the fact that SQL Server now runs on Linux, which may save us money on our operating system licenses. Although this is new, we can test the server to make sure we are comfortable with using this platform within our architecture to support the database layer of our farm. We know that we will have to use Enterprise to support the efforts of bringing the acquired farm applications in-house for use.

There are other areas as part of cost savings in hardware and software that we will be looking at next.

Virtualization

Which virtual platform will you use? You have many choices when finding a platform to support your VM servers. Some of the solutions cost a considerable amount, but then there is Hyper-V, which is part of your Windows license. There is also other virtual server technology, such as VMware, which is a valid platform as well. Find your platform for your virtualization and find out which platform is cost-efficient while giving you the support and stability needed for your environment. Host cost can also save you money as the cost for the server resources needed to support a development environment will not be the same as a production or **User Acceptance Testing (UAT)** environment. Plan your resources and do not just buy the same amount of resources for all the environments you plan to support.

Disk space and speed

Not all disks used for our host and VM servers or data storage need to be super speedy. There are some areas where we can let go of speed and exchange it for capacity and/or vice versa. Some areas that can use slower disk speed are backup storage locations and record center content for database storage. These areas are usually low usage and do not require speed to get the job done.

Cloud and Services

The Azure cloud is another option for your SharePoint implementation. You can build your infrastructure there and connect it using hybrid configurations if needed for Microsoft 365 and Azure AD. The cost for this platform can be expensive depending on the size of your farm, the number of users, and the horsepower needed for your server builds. You could also hire or train someone to manage the infrastructure, which may be expensive but could provide the goals the company is looking for. Savings for computer rooms, electrical, and other environment support would go down as well for cost savings.

Azure will bring some complexity to your architecture, as stated, due to the expertise needed to set this environment up correctly, along with those skills in the management of this architecture. Azure provides many services and software features that make it seem overwhelming, but with some training and coaching, this environment can be a rewarding experience due to servers being outside our organization and managed in the cloud. With that, it helps to cut costs using this platform, which cuts down on electricity bills, leasing for computer rooms, fire prevention systems, and server hardware costs.

If you are considering Azure, make sure you understand the benefits you can achieve using Azure:

- Deploy a SharePoint farm and scale it up and down as needed.
- Host in a cost-effective environment.
- Advantages of location with minimal investment.
- Disaster recovery.
- Move VMs from on-premises to Azure.
- Run Microsoft applications where they are safe.
- Run Microsoft applications where they have been tested to run effectively.

When configuring your Azure environment, you will want to build in high availability. The following diagram explains how your Azure environment should look for SharePoint Server 2019:

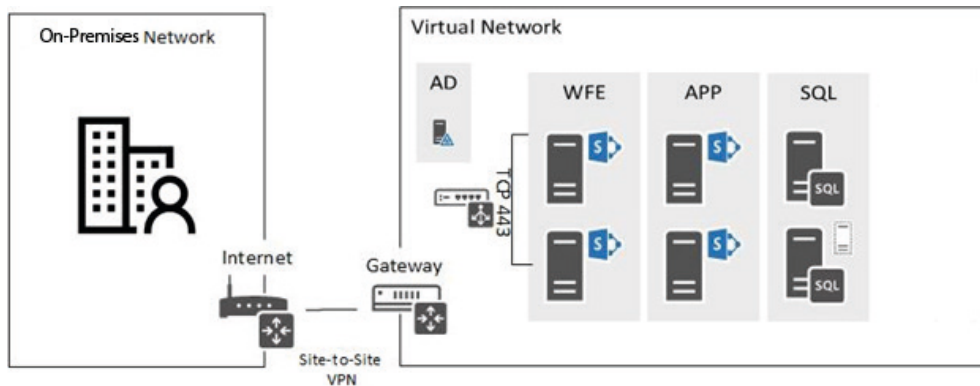


Figure 2.4 – Azure On-Premises Gateway

AD could be located on-premises or in Azure, depending on your configuration. For more information, you can refer to <https://docs.microsoft.com/en-us/SharePoint/administration/designing-a-sharepoint-server-2016-farm-in-azure>.

AWS

AWS is another cloud offering that can provide a cloud space to implement your infrastructure for your SharePoint environment. AWS provides similar supported cloud infrastructure that can be compared to Azure. While being not as complex as Azure, it takes a large learning curve to get started on both platforms, but as we are technologists, we know how to dig deep to learn new technologies.

Microsoft 365

Migrating to Microsoft 365 is another option to get SharePoint without the server hardware. There are other issues that go along with this type of implementation because you have to think about other Microsoft applications that would need to be moved as a part of this migration. Some of the solutions you use today may need to be rebuilt using other technologies provided with Microsoft 365.

We will see Exchange as part of the offerings for Microsoft 365. This is a migration that will take time and planning, which could lead to putting your SharePoint migration off until this is completed. The Office server would not be needed as part of your planning because it's built into Microsoft 365. This would be one server application we would not need to worry about as the functionality is already available.

As licenses are complex with the offerings in the cloud for the suite, there are different levels of licensing that are available. The higher the cost, the more features and space you receive. The platform also offers government tenants that are specifically created for government entities and do not support some of the flash and glamour that normal tenants support. You would need to look at these options very closely and find something you can move into.

Storage is key in this environment. There may be some splitting up of sites needed before your move. Splitting sites involves taking content from a site collection and moving into another site collection so that the site can grow and stay under a quota. As you sort the sites that are being moved from on-premises to the cloud to make them work as part of Microsoft 365, please be sure to take a look at the size of subsites and areas within the site collection to make the best decisions going forward.

Make sure to make the right decision going forward. Stop here and evaluate where you are and what your future is for SharePoint and other Microsoft ecosystem applications within your environment. Stepping to the cloud makes sense in some cases where you want to save money, but there is more to it than money when you look at the whole picture.

SharePoint licensing

Finding the best licensing for your on-premises implementation can be as easy as asking yourself whether you will be using business intelligence as part of your configuration. If you don't need it, then you should get the licensing for the standard version of SharePoint. Enterprise licenses are expensive, but with the need for data and functionalities that this version provides for reporting, KPIs, and other data reporting, this is your go-to solution.

With development environments, you will want to support the same version of SharePoint so that developers are developing on that same platform. There are versions of SharePoint that are free with Microsoft Partner subscriptions that can be used for this purpose, as well as free versions that can be downloaded as 90-day trials that also work. Ultimately, you want to gravitate to a license that can be sustained with no issues or complex situations coming up in the future. It's better to get a license that works forever than to plan your development on a 90-day license for your operating system, SQL, or SharePoint.

Battling contingency

Backup and **Disaster Recovery (DR)** are some of the most important solutions you will implement within a SharePoint farm. Without it, you will fail and fail miserably. The way you implement backup and DR will impact everything you build in SharePoint and how you could restore it from scratch if the need arose. This can be a rewarding experience in which you get a solution that makes this process easy, or you can stick with SQL backups and make your administrators work harder to restore and provide consistent support for your SharePoint implementation.

To start, as mentioned, SQL server backups are the basic backup plan for a SharePoint farm. Backing up databases, logs, and other areas of the server is very important to recreate the server when a disaster happens. In most cases, you will have an Always On configuration for the data tier of your architecture. Rebuilding this configuration and the associated data can be very complex without a tool to help you manage the databases involved.

If you add RBS to the mix of your supported configurations, you then add a different level of backup support that would need to be in place to support this integration. This solution is very complex and if your backup is not done correctly, you may not be able to restore your farm correctly, which could lead to disaster. The content used in a farm that is supported by RBS is programmatically associated as content within the sites using links to the content to associate the content on the disk within SharePoint.

Note

RBS is a way to keep large files outside of the database on a disk so that the files can be retrieved without disrupting the database and other users working with content in that database. The larger the file, the more work for the database to bring it to a user. If this is kept outside of the database, you get better performance when using large files.

Business intelligence as a service adds complexity to the farm and to the backup and DR solution that supports the farm. Business intelligence integrations need to be planned and even put on their own web application so that they can be used separately from the rest of the users in the farm. Separation using its own application pool separates the web application from the rest of the sites to provide better performance for those using this service. This service pulls on the server resources and will cause a delay in your data rendering if you're not careful to follow some best practices.

Solutions for backup and restore are available but there is only one I recommend and trust as I have seen this solution work and have supported it in many environments. AvePoint has a backup solution that helps in almost all scenarios for contingency planning. Their solution is superior because they have been in this space from the beginning. Over the years, I have seen many solutions they have offered and they really get administrators' pain points.

As I have stated, AvePoint offers a full backup and restore solution. The solution runs from its own server in your environment and uses agents to communicate with your farm and not embedded farm solutions. This is a very good way of integrating a solution from a third party into a farm. The solution is easy to clean up, not like embedded farm solutions I have seen that require troubleshooting to uninstall. Their suite of products gives you many solution options, including backup and restore, blob storage solutions, and so many other ways to support your farm.

AvePoint also has a solution for replicating content to another farm over a data connection. This will sync the content so that all content that is updated in the production farm gets updated in the DR farm. There are many configurations that can be determined for your environment but the bottom line is, you want to make sure you cover all areas with your backup solution that supports the SharePoint farm so that you can recover either from backup or a standby DR site.

Monitoring

Often, we think that as we add products or third-party solutions to our architecture, we are absorbing costs that we could be saving, but we have to look at this under different circumstances to support the farm proactively. The areas where we save money are not always cost savings but also downtime, which may cost you more in the long run. When looking at SCOM, which is a monitoring application used to monitor services and performance in SharePoint, this product can save a lot of cost in downtime, which in some cases can add up to dollar amounts for employees not being able to perform their jobs. If you look at it from a hosting model where we want the best up-time possible for our customers, this is a component we would not want to leave out of our architecture.

The savings monitoring can bring to the table are invaluable to our architecture, as we can find out areas of concern before something happens that can bring down the service. When a service is down, you lose confidence and you also lose money. Most customers will request information on why the service was down and may ask for money back for that downtime, in the end, depending on the severity.

Customers do understand, but when you have a business that depends on a service to work, they expect the service to work as it should. We often take monitoring for granted and use other tools and checks to figure out our pain points, such as Windows logs, ULS logs, and Task Manager, where we can monitor the resources on our servers. This is not the best effort for SharePoint as there are many services that could be in limbo if not monitored consistently.

There are many tools out there that work to provide monitoring, but SCOM is one of the more integrated tools that can work within your farm and other Microsoft products in your enterprise. This product gives you a one-stop solution for your Microsoft products and interface into those enterprise areas that need constant monitoring. There is another tool I really like called SolarWinds that also gives you real-time monitoring of services and server resources.

There are other areas where the benefit of having other applications integrated into our architecture outweighs the costs that come up in the SharePoint cost for hardware and support. Make sure you protect your investment while saving in other areas of the platform.

Now that we have understood how we can manage the cost of our environment, let's look at the aspect of resources.

Planning – resources

Adding resources also adds to the cost of our project, but in most cases, the resources requested will be needed to implement and support the project. Resources are generally handled by your project manager but with full transparency supporting the IT team and management. Everyone involved needs to make sure that there is a good project plan as part of structuring this project and make sure there is the availability of resources, as well as enough team members to support it. The team also needs to make sure that they have the cycles to start and finish the jobs they are assigned to complete.

There could also be concerns with resources that have been assigned to the team where there could be other projects these resources have that could take priority or eat into the time they can spend on the project. One of the biggest errors I have seen in the field is under-resourced SharePoint projects. This is one area where you do want to pay attention and make sure you either hire personnel or contract the positions to get the work completed.

The change management board and operations teams also come into play in planning as since we are adding or changing resources within the environment, these changes need to be confirmed by the owners of the environment. This can also add more pain to the implementation and take up time you were not planning for. Make sure to add in planning for this change review to make sure there are no hidden scenarios where you will get behind on the project. One thing you can do also is talk to this group before you get started. This will help them understand what's coming and they may be able to give you details they may need to move forward successfully. I notice this especially in secured areas where the SharePoint service would be used.

Another issue that is always seen from my experience is that I will run into a SharePoint admin that has not had much experience with the product and/or there is one SharePoint admin supporting a large farm alone. I have also seen cases where SharePoint is running without any real supervision but relied on heavily within the company. In these cases, these scenarios almost always bring to light the issue that the support personnel are overwhelmed and do not know where to start to fix issues and expand when added requirements arise. The team, in some cases, can also be running the help desk, managing customers, applying updates to the servers, and supporting all other areas that come with the SharePoint territory. Make sure you budget for the right size team for the environment you want to support.

Here is an example of a resource matrix to support SharePoint:

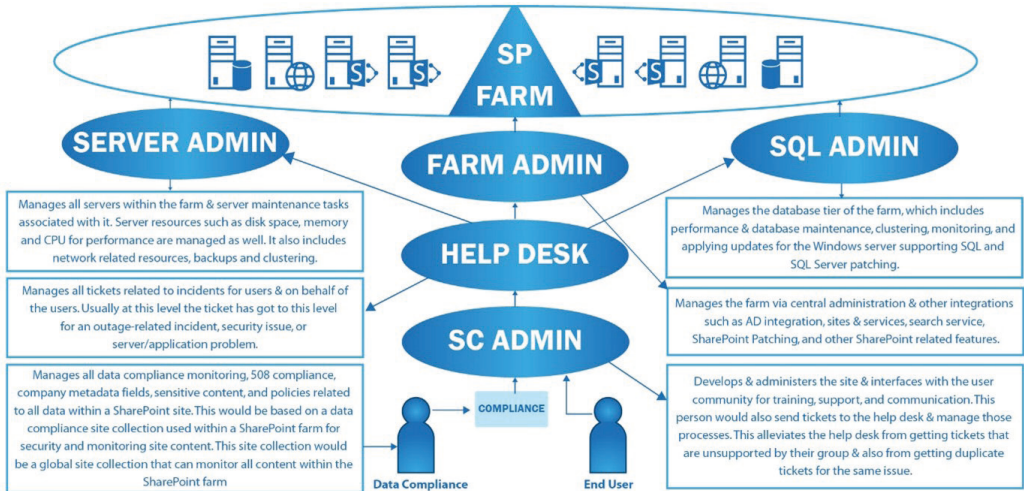


Figure 2.5 – Resource matrix

To avoid scenarios where you have overwhelmed support personnel, management needs to understand that this product is not easy to implement, manage, administer, support, and maintain. The platform requires many skill sets, along with experience, to really support the environment in the right way. There are many best practices that can really drive you crazy if you do not have experience with the product that will creep up on you at a later time. There is a reason why these best practices are used and specified in the Microsoft documentation to support the environment, so do not bypass them.

Being new to the product or not as well seasoned can really cause projects like this to fail. Your resources should be somewhat seasoned in the SharePoint space and you should have a good understanding of the product. Remember that your project is only as good as the people implementing it.

The outcomes of this resource exercise should help create thought processes around gathering resources to support the platform for the help desk, site collection admins, and farm admins. The support for the platform is essential and we should not hesitate to get these resources in place before starting the implementation. Training and knowledge sharing also make a big difference in these roles; do not forget it!

I can't tell you how important it is to have resources available that understand the product and can help make supporting the product easier using separated roles that bring together a team of knowledgeable professionals. You will see a big difference in how users perceive your service and how less complex the support process can be.

Assessment review

An assessment review is a meeting of the minds of IT and management supporting the efforts of the implementation. This could mean your CIO, director, and, in some cases, the CEO would be part of this meeting. The goal of this meeting is to review your assessment and its results. As assessments can be done over intervals of time, these meetings may happen when assessments are needed for the farm environment. The attendees would have a chance to review the document before the meeting so that they can come to the meeting with an understanding and questions about the document as well. This gives those teams a heads up on what the project consists of, gives them an idea of the resources that may be needed during this project, and helps them to plan for what resources can be provided for you to work with during the project.

This is a somewhat difficult task because you do not want to overstate the project goals and you do not want to show huge costs for the project, nor do you want to overstate the requirements with solutions not needed. When management is reviewing whether to approve the work, you want to be cautious and explain things in good detail (where they need to be explained) and leave some areas out that are common and not elaborate on them in great detail if no questions are asked. This is because the scope of the meeting could be directed in the wrong direction due to comments on details that are already clear and understood.

However, we should be prepared for anything during the meeting and questions could come out of the left field. Make sure you know your presentation well and practice it with the other team members so that everyone understands the direction the meeting should go. If things are rehearsed or talked about in depth, there will be no error in the delivery of the message sent during the meeting. Keep the meeting simple and to the point, validating the assessment and areas of concern, how you plan to remediate those concerns, and the direction or path for the future.

Management will be all ears and listening to certain details. In the meetings I have been a part of, most managers and even executives do not want to hear too many technical details. They want to hear concerns, fixes, and costs, as well as how you are addressing those concerns. Those areas of technical concerns help with new solutions you plan to implement, but overall, management has no ears for IP addresses, protocols, and so on in most cases.

Now, I am telling you this from my experience, but there could be some CEOs and upper management who may want to hear more technical details to figure out why you are heading in a certain direction for the platform. Some CEOs and other management are technical, and in some cases, you will need to explain your position more thoroughly. You need to gauge your situation and plan for it accordingly.

Prioritizing requirements

As things change within an organization, the goals set out within an organization may change as well. When an organization makes those changes to its future goals, this can bring changes in personnel, security, structure, and business processes. As part of those effective changes, IT can be affected, which can bring change to the way the IT department delivers solutions and secures data and content, platform support, governance, and other IT policies, which, in turn, will affect the way the technical teams support the enterprise.

As a part of the goals of this planning prioritization exercise, we need to define the purpose and motivation for our new or migrated SharePoint farm to this newer version of SharePoint Server 2019. When defining priorities, please consider the following items:

- Top tasks
- Milestones
- Deliverables
- Schedules
- Organizational charts
- Resources

All these areas can affect our implementation project in ways where we will need to rework our project schedule. We don't want this to happen, so planning around current and long-term projects is a must to avoid any situations where you have to, for example, change your schedule or resources in the midst of implementation. If you want management to get involved and give you some grief, just let that happen and you will see things fall apart.

Another example would be a change in deliverables. If we had a certain set of deliverables and all of a sudden you forgot about RBS, and have to make a change where you have to go back and ask for money, this brings the pain. You want to make sure you prepare all areas, especially technical solutions that form the environment, to support the farm and its functional components.

Prioritizing what's important as part of the implementation is needed because there are logistics involved as well. You need hardware before software, you need a network before you can configure servers, and you need SQL installed and configured before SharePoint can be installed. These examples help you understand how important order is in your project plan.

With that, there will be some tasks that take priority in these examples. In the case of ordering software, finding out when the software would be delivered is an example. The delivery of equipment and software can ruin a project plan as well. It's best to get a list of the items you need to start the process before you get started writing your project plan, so you don't have any items that fall by the wayside. Licensing and even funding sometimes take time to procure, especially in government projects. Make sure to put in requests once you finalize your architecture so that these areas can be in the works while you are finalizing your plan.

This is a good place to start evaluating the timing and prepping resources. Look over your work and make sure you have taken everything into consideration. Changing things now can make a big difference in your timing, so you do not want to change too much at this point. Also, evaluate the platform you are proposing. Make sure you're making the right decisions and press forward.

Planning – SharePoint farm design

Generating a mapping of how site collections per department will be represented in a hierarchical architecture is a task you should carry out with the management and stakeholders. The hierarchical order can make a difference in how users navigate the structure of the sites but can also be confusing to them if not thought about thoroughly.

Creating an intranet of the content doesn't have to be a hard task. Use resources around you to help with the organization of the sites. Where I believe this process goes wrong is when teams who are responsible for this architecture do not take into consideration the landing page. The landing page in all site collections can be used to help users navigate the site collection and even sites within the web application. Users should be able to browse just like when they access content on an internet site, which gives them links to areas within the site collection that are available to everyone. This method gives you the ability to bring content that could be buried in the site to the forefront, but other users outside your site may need access too. Breaking inheritance in a site, list, or library is always looked down upon, but in these cases, this should be considered to secure information that not everyone should have access to. We would also use a separate site to support content that is "for everyone" as well. Presenting hyperlinks that expose the content should be part of this exercise, which is to organize the sites and content for ease of use.

Some sites I have seen have terrible designs and content structure. Content exposure is so important on landing pages; for example, the name of the site is important with a real description of the department's responsibilities in the company. This verbiage makes it clear to the user looking for information that they are in the right place to get the information they are looking for. Listing the name of the site collection administrator and their contact information is another piece of good information that should be a part of the site collection landing page. There should also be some information on some team members and links to the department forms where information is collected, for instance, an employee vacation request form. This could be useful for the users surfing your site where they shouldn't have to have lower-level access to fill out a form that could be used by everyone.

As always, security is another area of concern of most site owners, but it doesn't have to be. Using the landing page as a read-only page is commonplace and in SharePoint 2019, you can use a team or communication site as your landing page as well. If the user is not a team member, then give them access to what they need from the landing page and secure the content they need to have access to with permissions. Make sure to create groups for your department users so that those users do not get mixed in with users with read-only access. All employee groups would get read-only access and internal groups that work behind the scenes within the site could give these users deeper access as needed.

If we look at the external sharing of information in our farm, we could see how some of the components within SharePoint 2019 and the cloud affected as part of your implementation. There are some things we want to be aware of in opening our content for sharing outside the company. Overriding that governance rule will make your admins work a little harder. You also need to trust that your users are sharing information that is OK to share. The security of your content is most important when it comes to sharing. I have seen some bad practices that could cost a company their secrets because external sharing was enabled and other mobile solution apps were being used within the company without IT knowing. Be on top of external sharing and make sure to secure your content.

Site collections are a great way to capture a bulk of content at a time as these can be a one-to-one relationship with content databases. In this configuration, you now have a database that encapsulates all the content for one particular department. Management of a content database is what you would like to work with as a farm admin and not a content database with mixed site collections from different departments. This site hierarchy gives you complete isolation of the content from a security and recovery perspective. All backups are of that database and content can be restored individually without having to interfere with other departments' content if something were to happen to the database. Migration efforts are clean as well, with no mixed site migrations or work beforehand to separate sites into separate content databases.

Database naming conventions should be used, as well as site collection URL names. We should, as administrators, be using good naming conventions to make sure our content is organized and named so that we understand what that content is. This goes along with naming our site collections and providing content in the site collection that describes it. There is nothing like going to a client's office, reviewing their farm with them, and seeing errors where content databases cannot be contacted. In review, I sometimes find out they do not know what the database is supporting, what the content is being used for, or even what department it supports. This all happens because it is named improperly. Please don't be that client.

Site collection templates should also be used to add functionality to your farm's logical structure when needed. One of the big perks of using some of the site templates are data compliance, record center, and document center templates. These templates can enhance how your logical structure works together. These templates can be used to create automated processes that protect content and store content. These processes use key data fields to set policies that automate the protection of data. Make sure to use these features in templates so that you have a well-rounded process in place when needed.

Physical server assessment

As we start our physical planning for servers and roles within the farm, we need to understand what architecture will best support the user community and be the least complex to support. Some solutions may be needed to support our farm, but it's a best practice to really understand your requirements and not just add solutions because they will be used minimally. One example of that would be a distributed cache and web frontend MinRole. If I was providing services for 100,000 users, then I would most likely separate the cache cluster process over several servers, but if I was only supporting 5,000 users, I would most likely keep them together on one server for a small deployment and over two servers if I needed redundancy.

Note

RAM comes into play as in the initial farm, we will only see 5% of our RAM on each server supporting the MinRole dedicated to this service. The more we play with the configuration of distributed cache, the more RAM you may have to reserve for this service. We talk about this more in *Chapter 9, Managing Performance and Troubleshooting*.

Physical design is not hard like it used to be. Before, we had to worry about services and what services were started on what server. Now, with MinRoles, that issue goes away if you use them. We can now be alerted for compliance based on the role of the server in the farm. If a service is not supposed to be started, we will see that the server will be out of compliance. MinRoles help with these types of scenarios by keeping the services needed to support the role of the server minimal. In the past, we were responsible for managing this ourselves, and I am sure Microsoft saw the writing on the wall from its long list of support tickets, which gave them the idea to put this MinRole in place. The MinRole was created to help administrators and was started in the MOSS version of the product, but was discontinued in SharePoint 2010. The MinRole helps administrators follow best practices and wisely use server resources to support how farm server resources are configured and to support the performance of those resources. Here are some examples of MinRoles:

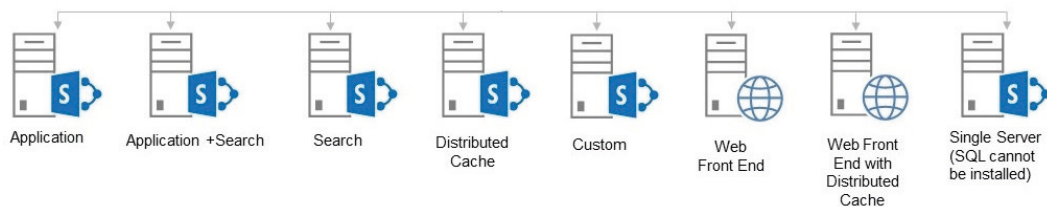


Figure 2.6 – Examples of MinRoles

In creating a physical architecture, we have to know what we are building. If the farm is going to support 5,000 users, then we figure out how important the farm is to our company's application support. Is it a tier 1 application, or is it tier 3, where we don't need redundancy and quick response times? In most of the companies I have worked at, SharePoint was a tier 1 application because everyone used it. I have also seen where it wasn't tier 1, but if one of the applications within SharePoint went down, it was a fire drill. We have to understand how SharePoint needs to be supported and have the company recognize its importance in the enterprise.

Now that we know our architecture will be tier 1, we need to take into consideration redundancy and up-time for the farm. Server resources and topology will mean that we have two servers for each tier and any other services that need to be robust in performance. Looking at our scenarios in this chapter, we know that we are part of an acquisition. The acquisition is bringing Power BI and large files to the table, which means we need a separate BI server redundancy and RBS as part of our architecture. 10,000 users may be a number that may be reached sooner or later, so three web frontends will be great as part of our architecture. A search may be a service we want to duplicate as we do not want this to fail as well.

Looking at these areas of concern, we can create an architecture for the hosts and the farm shown in the following figure for SharePoint Server 2019:

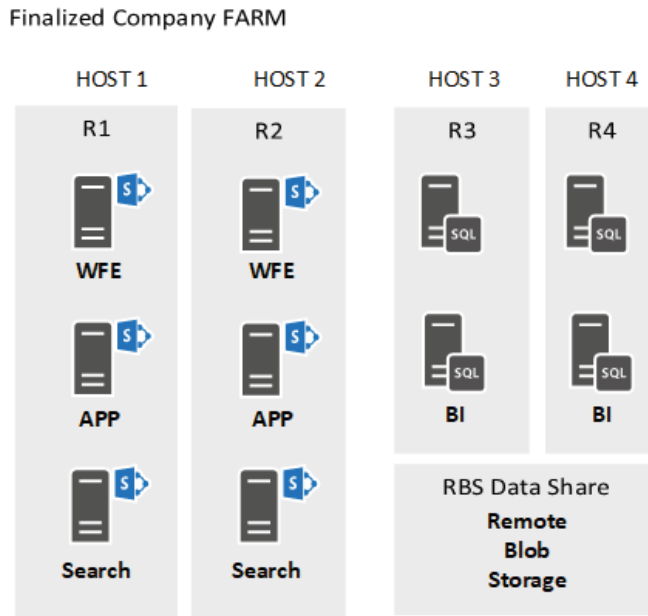


Figure 2.7 – An architecture for the hosts and farm

As you can see, we have redundancy on the hosts and redundancy within the farm. We also have the server resources to run the farm at a minimal requirement for SharePoint servers at 16 GB for each server, and all SQL servers at 64 GB, which is more than enough for this configuration. The SQL server needs this extra boost as we are using Power BI and SQL reporting services within the farm configuration, which can lead to big queries that pull on SQL resources pretty hard. If you remember, there are a couple of new applications we are introducing as part of the acquired farm configuration and these will be used by our users in a few different departments.

Aligning a farm to the requirements of the assessment is key in building a topology for the physical architecture. Make sure to take into consideration all areas of configuration, user traffic, and other areas that can pull on resources. Do not undersize your farm and always test your farm using a load tester as in Visual Studio. This will give you a sense of how the resources are going to perform using the number of users expected to be part of the environment that will use SharePoint.

Dev and test environments will also need to be stood up as part of the architecture. Dev environments vary in size. Usually, we have one SharePoint server and one SQL server as part of this environment just to do some little development on. This would support out-of-the-box development for different departments using separate site collections. Scheduling of reboots and testing should be coordinated with the users that require this development farm.

When talking about larger environments where there are several developers, each developer should get their own server. The problem with SharePoint 2019 is that it is not like older versions where you can install SQL Server on the same box and/or use SQL Express, as it is not supported. So, each developer, in this case, needs to have a separate SQL server for each server farm, or use a large SQL server to support all developers, using separate namespaces. This can work, but having those developers independent makes more sense as each should have their own environment.

Team Foundation Server comes in to play as well, so any code that's developed can be pushed for deployment and tested in the test environment before it's pushed to production. Pre-test environments can also be stood up in some cases where you want to validate before putting the code on your test environment. Test environments should be a duplicate of the production environment and should have minimal use and test content. This environment should be clean and the only changes made should be good changes that were tested previously.

Time and money are always part of the equation, so with that, we need to do our due diligence when planning our IT architecture. We need to review our requirements and make the right decisions to bring the best solution to management for the best cost. Looking at our current state and our acquired farm, we have to combine each of the farms and solutions into one. This can be a complex process depending on your situation.

In this situation, we have some clear guidance, and we understand this from the information that was given in this chapter. We have pointed out the server resources currently in place, and some details on the farm configuration. Assessment data has been gathered and again, all bases have been covered when finding out the information on SharePoint Server 2019.

What role does the cloud play in your environment? Can we build this into our architecture to save on costs? Well, in this scenario, we don't have any requirement to add the cloud to our migration process or even a hybrid solution, but you may find yourself in this situation. If you do, study the cloud thoroughly; there are many subscription models, and within those models, there are solutions that you may need that may not be offered in others.

Call Microsoft for support if you get stumped and do not guess on this type of configuration. Licensing can be very complex and it may not make sense to you. Make sure to ask the experts when coming up with strategies to move to the cloud.

As you can see, building server architecture is not hard but you have to take into consideration all the requirements and research: how you can create a low-cost, extremely robust, and best-performing server farm for your company.

Design – documenting the design

From my experience over the last 15 years, I have seen two design documents while I have been supporting SharePoint. Most environments I have worked and consulted in run in a reactive support method, which is an uncomfortable seat for those that manage the farm. This is a sign that companies are not making the effort and exerting due diligence to document the installation, configuration, and use cases of the SharePoint farms architected to support their company's collaboration efforts. It was often said in the past that installing SharePoint was easy, just throw the disk in and walk away. This was said early on when 2003 and 2007 SharePoint were just getting started, which was not true and showed in so many failed deployments of the product.

Little did these people know that their support for the product would take a considerable amount of time on the phone as they wondered why certain errors and functionality for users of the product were not working as they should in these environments. Early on in the evolution of SharePoint, there weren't a lot of documents or sites you could use to support yourself through a project like this. There was a very minimal amount of information available, even from Microsoft. This happened due to the product really not making much headway during the 2001, 2003, and WSS versions of the product.

When 2007 MOSS hit the market, it seemed like there was a wave of interest in the product, and Microsoft really got caught off guard at how this took off. Once they saw the need to address these issues, we started seeing more support for SharePoint and more websites and blogs. Some of the third-party blogs and sites could not be trusted in those days due to the newness of the product. Someone could have found a solution to an issue with BCS but then you find out it wasn't a best practice on the Microsoft website. There was a lot of pain and learning during those times, and you had to almost do some of the configurations blind and test them yourself to see whether the solution worked.

Now, with the vast information from Microsoft and blogs online, there is no excuse to not have documents in place to support your efforts for the SharePoint enterprise. Yes, it takes more time, but be thorough so that you can be successful and have references on why, what, and how you created this platform. I cannot express the importance of this and other documents that I am walking you through in this book enough. These are needed to support the product and user communities using the SharePoint farms for services and solutions. This also helps you to understand as an admin or architect what you have designed. As you configure and support the farm in the enterprise, this document, which is the foundation of the build, will be able to be referenced and updated in case you need to review a configuration or make changes as you grow.

So, in my efforts to help organizations do the job of supporting their environment with documentation, I have composed an outline of what I use to document the design of my SharePoint environments. This documentation is for the design of the SharePoint environment and is not intended to collect any SharePoint installation step-by-step instructions, but rather to cover the build of the environment that frames the moving parts and how they are working together to support the farm. The document should include an executive summary, solution design, and security.

Executive summary

This section of the document should be used to give an overview of what the document represents in support of the SharePoint project. Here, we would write a summary of the document within this area for executives who may not have the time to read through the entire document. This portion of the document includes the underlying topics listed:

- **Purpose:** This section of the document should be used to give a brief description of the document's purpose. In our case, this document represents the design and configuration for the SharePoint enterprise environment we are deploying.
- **Scope:** This section of the document lists the scope of the environment. This could include the Office server, SQL Server Reporting Services, PerformancePoint, PowerPivot, storage configurations, third-party integration, or anything that is not a native SharePoint installation.
- **Out of scope:** This section of the document lists the services or solutions within the environment that will be out of scope, such as business intelligence, RBS, hybrid connectivity, or third-party tools you may have discussed previously that didn't make it within the budget.

- **Assumptions:** This section of the document describes your design assumptions, which would be based on the requirements you gathered. This would include things such as PPI data restrictions within the environment or that access to the SharePoint environment will be authorized by AD.
- **Terms and abbreviations:** This section of the document should be a table of abbreviations used throughout the document that support protocols or even solutions or frameworks. This gives the reader a list of those abbreviations in case they do not understand them. This should also include the meaning of the abbreviations so that all abbreviations are understood in layman's terms. You could also add a hyperlink to those referenced abbreviations as well to give more detail to the reader.
- **Reference documents:** This section of the document provides a list of documents, which should also be in a table within the document. These documents are supporting documents from other supported IT or project-related areas that will be supporting this SharePoint design. This would include documents such as governance, installation guides, project plans, and any documents you would like to add that will support this work. Links to documents within SharePoint should be used so that documents can be in a centralized location. Referencing documents in shared drives would only confuse people as naming and versioning changes in this solution.

Solution design

This section of the document provides details of each portion of the solution. So, in our case, since we are designing a SharePoint enterprise solution, we will need to mention all the design requirements we reviewed to create this environment. You would want to mention what services will be used to support the environment from a SharePoint perspective.

We would also need to mention how the environment will be supported from a security, capacity, scalability, and availability perspective. You would also include contingency plans as bullets on how you would support the environment in a disaster crisis. Mention any security design considerations you took during your research as well. A summary of these items and then each of the following listed areas would be presented in a more complete explanation:

- **Network:** In this section, you would want to mention best practices; for example, SharePoint Server roles as in a **Web Front End (WFE)** server would not run any SharePoint services or the WFE should have index partitions for search residing on the server as part of the search configuration. You may want to mention any other network-related areas, such as VLAN configuration and domain information that might weigh in on the design. Include any diagrams as well.
- **Hardware:** In this section, you would want to mention best practices related to hardware. This could be related to SQL Server as you may not virtualize this hardware or mention which type of virtualization you will be using, such as Hyper-V or VMware. Make sure to mention anything you are changing in the hardware design from the norm.
- **Software:** In this section, you would want to list any software that would be used for the installation of this enterprise solution. This would also include listing the prerequisites as well as any extra tools, such as ULS Viewer or Fiddler, which are utilities that you might use for administration.
- **Environments:** In this section, we want to list the environments and their purposes supporting the enterprise solution, which could be dev, test, UAT, and production. We would want to mention any best practices, such as any separate service accounts and/or domains that will be used for each environment for security separation. You would also want to mention a release management plan or guidance on how this process will be managed within the environments. Include any diagrams or supporting documentation names and links as well.
- **Virtualization:** In this section, we want to list all servers that will be created in the environment, using a table with names, descriptions, quantity, CPU, memory, operating system type, and other information that can be captured for each server you are creating to support the environment. We also need to mention any best practices that we will use in the configuration of our hosts and VMs to support the environment. As an example, mentioning a best practice such as no VM server will use dynamic memory allocation would be the best practice of what to list here.

- **Availability:** In this section, we want to list all specific service-level agreements that will be defined as part of the customer agreements. Only list sections that are covered through the SharePoint service and components only. This section should not include disaster recovery or data protection. You would mention percentage up-time, redundancy specifically supporting the enterprise solution, and specific services within SharePoint that will be redundant, such as search or application services that support redundancy. Then, include those that do not support redundancy, such as SMTP, from a SharePoint perspective.
- **Load balancing:** In this section, we will list how we plan to support load balancing as part of our enterprise solution. This would include what type of load balancing, hardware, or software (NLB) to use, and how these components will be set up or configured to support the SharePoint environment. This could include mentioning SSL certificates, VIP pools, and distributed cache, to name a few.
- **.NET Framework:** In this section, we will list the .NET Framework that will be used to support the SharePoint Server 2019 installation. We would need to be sure to mention .NET 3.5 if it is still relevant in your installation as well.
- **IIS Settings:** In this section, list all configurations that will be used within IIS and mention the version of IIS being used. We would also want to mention log locations and how often these logs will be captured. Also, list all web service extensions and which are allowed and which are prohibited for use on the SQL and SharePoint servers.
- **Farm services:** In this section, we would need to include a table that lists all SharePoint services, which could include hybrid connectivity. This table also provides columns for server host and state, meaning stopped or started. This gives a precise configuration of the services that will be available within the farm and what servers they will be running under. The use of MinRoles and service compliance, introduced in SharePoint Server 2016, will help to keep your servers compliant at all times.
- **Active Directory:** In this section, mention all AD interaction that will take place and any required objects that will be needed to support the SharePoint farm. This could be mentioning the domain name, **Organizational Unit (OU)** structure, service accounts, and or security groups. Also, Azure AD could come into play, as mentioned here, in this document.

- **Capacity and storage:** In this section, we talk about the databases and storage needed for the overall enterprise solution. User capacity would need to be tested and can be tested using a Visual Studio load testing application. This would be good to use so that you can verify the number of users the hardware you configured will support and give the solution great performance based on best practices. Defining the types of drives could mean OneDrive or search considerations in the cloud that will be used as part of the environment, and their speeds are crucial as well as this can keep the cost down by using slower disks in areas where they can be utilized.

We should also document the sizes of *all* databases and configuration details and define all database size limitations within this section of the document using a table. If you're pre-creating databases, this is a good place to list those databases, and if you are not, this is a good reference for naming conventions as you install the product. As a documented process, we would also want to document our database maintenance plan here as well.

Don't forget to define drive sizes for our servers for the expected disk space needed to support search indexing. When defining the search indexing location, we must remember that indexes can be replicated to other servers depending on their role in the farm. This location is defined during the SharePoint Server installation process as a *data* location or will reside on the cloud if you use search in a hybrid configuration.

We also need to remember logging for each component we are using to support the environment. This includes SQL with Always On, SharePoint, and IIS. We also want to remember that logs grow substantially when migrating content from one farm to another. Make sure to account for these sizes when building your servers.

- **Web applications:** In this section, we define the dedicated web applications that will be used as part of our solution for the administration of SharePoint and for supporting our user community. Web application settings should be captured as part of each of these web applications, which define areas such as authentication type, time zone, file upload size, and others, and should be documented as part of this section of the document.

You should also define standards that should be followed in naming web applications, the application pools associated, and databases associated. We should also define our sites and what configuration details should be listed here in this document. This should also include all site collection best practices and areas of web applications that should be followed within some guidelines for site collection admins.

Note

Remember, host-named site collections are discontinued in SharePoint Server 2019.

- **Central administration:** In this section, list all details pertaining to the central administration site, which could be a vanity URL or the port that the site will run on. We would also want to mention access to the site as this could be a limited community of users. With that, an AD group should be created, which should also be listed here.
- **Site collections:** In this section, let's cover how we will create site collections and how they will be used within our organization. You could mention that a site collection will be created for each department or that a site collection will be created for each site as determined by our stakeholders. We also want to mention quotas and other details related to metadata, content types, and site columns.
- **Email:** In this section, we need to define how email will be used within the SharePoint enterprise solution. Define use with workflows and notifications as well as the configuration of TLS using the new configuration settings within SharePoint Server 2019.
- **Search:** In this section, we need to define all that is search. Define the configuration, any content sources that will be configured, redundancy configurations, index and capacity, crawl logs, and any special configurations. Crawling of content should also be captured here as schedules and other targeted content sources as per their requirements. Service accounts and the configuration for using those accounts should be defined as part of this section. Remember, hybrid could come into play in this configuration as well.
- **Profile imports:** In this section, we define profile imports and scheduling for imports within our SharePoint configuration. Any service accounts that are needed that will be used as part of the import would need to be defined in this section as well. Remember, Azure AD could come into play here as well.
- **Monitoring:** In this section, we define how we monitor the enterprise solution and mention what tools we will use to do so. As we define these areas, we want to make sure that we have made mention of any third-party solutions at the beginning of the document that are in scope. This would include monitoring of the network components, services, servers, VMs, and so on. We should also set any thresholds per component that need to be captured in this document so that others that are administrators of this environment understand those thresholds and make sure to adhere to those maximums. These thresholds would be defined by testing using the Visual Studio tools for simulation or other tools as you see fit.

- **Backup and recovery:** In this section, we list all areas of the farm that should be backed up that are essential in recovering the farm in case of disaster (DR). These documented areas should be listed and configured in your backup software. The frequency of these areas should also be documented as some may not need to be backed up as often, such as a records management platform where documents are finalized and in a view-only access area. We would also need to consider SQL database backups, which should be part of a maintenance plan but could also be picked up as part of a daily backup for offsite storage. Timing and frequency should be considered as part of this documentation.
- **Software updates:** In this section, we need to define how software updates will take place, either manually or automatically. In most environments I have been in, most do their patching manually. This would be my recommendation as well. We should be testing our environments through development, test, UAT, and production to make sure these new updates are working as they should. This alleviates the destruction of our production environment as we test through those lower environments for verification of the patches.

Most companies also have separate teams that support individual IT areas, so in that case, you will have an overlap of support for updating servers, SharePoint, and SQL Server. In this case, scheduling becomes a factor or you have your SharePoint admin update all areas of the server. In a lot of cases, SharePoint admins can have many servers, depending on how their environment is configured, and could have to do updates in a certain order based on the application.

Some third-party tools require servers as support for their platform. My recommendation is to give the SharePoint admin access to update all servers supporting the environment. If the environment is built for redundancy, then we should be equipped to provide users around-the-clock access to the environment. In this case, we can use what are called zero-downtime methods so that we can update the server without disruption. This would mean all levels of the stack would have redundancy: WFE, the application, and the database.

- **Ports:** There is a pretty detailed list of ports needed for SharePoint to communicate between servers within the enterprise. These ports should be documented here either through diagrams or a table listing those ports and descriptions. With SharePoint, there are intra-server communications, which refer to how SharePoint services communicate, and extra-server communications, which refer to how SharePoint communicates with other servers and applications supporting the platform. We will detail that list and the script to configure them later in this book.

- **Development farm:** In this section, we define how the development environment will be used to support the enterprise solution. In most cases, the development environment, as mentioned, is the first environment to get patches and updates related to the servers and applications supporting the enterprise solution. Using a development environment supports the total solutions from a development standpoint. This is the messiest environment in most cases and there could be multiple servers, depending on the number of developers supporting it.

Consolidating developed code would be another defining area we would want to add here in this section. If you are using Visual Studio and Azure DevOps Server, then centralizing code is fairly easy to do even if there are multiple developers and servers. From there, we define how code is entered into the testing environment, where there should be only one or at most, a few testers reviewing the functionality of the coded solutions. Once it is tested, there will be a verdict that it either failed to meet the requirements or successfully met the requirements. At that point, we would then move the code to UAT.

- **UAT farm:** In this section, we define how the UAT environment will be used to support the enterprise solution. This environment is used as the name states. Once code or even UI functionality tested in the lower environments is moved to this location, users can log in and test the solutions before they are moved to the production environment.

We will speak more about this in *Chapter 12, SharePoint Framework*, to provide some lessons learned and best practices. After working as a developer, I saw many things that could lead to disaster, along with choices that need to be made as an admin function or a developer function. This decision could cost you if you are relying on code to build environments for new developers and rebuilding a production environment that was lost due to disaster.

- **Migration:** In this section, define migration and how it will support the enterprise solution. In reality, migration can either come as a tool that requires its own server or workstation and can be a process we follow using our SharePoint server and SQL servers. Document how the tool will be used, especially when it comes to environment migrations, release management processes, and who has access to the servers and tools. Document the selected tools and processes chosen as well to do migrations and the content that will be migrated. Schedules and other areas concerning migration will be documents in project-related documentation.

Note

Documenting any of these sections with supporting diagrams is also a great way to present solutions as part of this documentation.

Security

This section of the document should be used to give an overview of what the document represents in support of the SharePoint project. Here, we would write a summary of the document within this area for executives who may not have the time to read through the entire document. This portion of the document includes the underlying topics listed here:

- **General:** In this section, we need to define general security practices that will be followed within our SharePoint environment. Some of the areas that could be mentioned in this area would be the central administration location, direct user access to databases, separate accounts being used to separate services used within the environment, and any other SQL or environment general security best practices you will follow that are part of this enterprise solution.
- **Physical security:** In this section, we need to define any physical layers of security, as in server rooms and PIV card security, which would count as physical security accessing servers and desktops. Physical security could also be part of a certification you hold as more companies are using these certifications for government contracting. Any physical security enhancements and authorizations would be good to mention in this section.
- **Authentication and authorization:** In this section, we need to define which types of security you will use for authentication and authorization. If you're using AD, you are most likely going to use claims authentication and Kerberos for integration with AD. There could be a mention of other authentication areas, such as SAML, which provides the integration of PIV cards for more physical security options. Authorization can be mentioned, as in how you use groups within the solutions, either SharePoint groups or AD groups.

Note

Always use AD groups for your SharePoint security when you can. If there are areas where they just don't work, then use SharePoint groups.

- **Antivirus:** In this section, we need to define the type of antivirus we will use to support the upload and download of documents within our SharePoint farm. This is one area I saw during my travels that was abandoned because everyone thought since they had antivirus on desktops, there would be no need for it to be installed on the farm. My opinion is you always need to be careful and don't take chances with your data.

With antivirus, there are areas on the server that need to be documented as well, which should be excluded from the antivirus scanning those areas on the hard drive. Those areas are documented on Microsoft's website. These exclusions help to protect files from being compromised by the antivirus program and interrupting the SharePoint service.

- **Auditing and policies:** In this section, we need to define how we will audit users and what policies we will put in place to ensure data compliance. **Information Rights Management (IRM)** and a new feature called Data Compliance that was introduced in SharePoint Server 2016 can be used to flag documents and make sure data is protected from use by users who do not need access.
- **Security principles:** In this section, we need to define how admin and service accounts will be used in the solution for the separation of duties. Document their purpose, local policy settings, and database access in this section. Use a table to pull together the best results. Local service and network service accounts should be documented here as well. Also, document group permissions as well, as out-of-the-box SharePoint creates groups that are used within the configuration. These are often forgotten about. Document these groups and make sure they are a part of your documentation for reference.
- **Group policy:** In this section, we need to define GPO settings. This is one area where a lot of admins get stuck and wonder why security isn't working in the environment. We need to make sure that all of these policies are documented, as well as GPO settings.
- **Blocked file types:** In this section, we need to define a list of file types that will be blocked from use within the SharePoint libraries. These file extensions should be documented so that they are captured for reference.
- **Appendix:** If needed, add an appendix to the document.

You are not finished with creating your design document as this document is a living document created to capture changes in your design. Keep this document safe in a place where only you and your team can get to it. Have someone review it as well to make sure you hit all areas of your design to support the services you are planning to configure in your farm. The key to a successful implementation is getting things right the first time and always checking and rechecking against the Microsoft best practices and your assessment.

Disaster recovery

In this section, we need to look at recovery from the unknown glitches that can happen that bring down the server environment, where the service is unavailable or partially available. This could be the loss of the application services or even just the loss of data. In the case of SharePoint, there are network components that can also cause issues as well, such as load balancers, routers, and DNS, which can alter the availability of the service.

With that, we need to take into consideration the company's policies on the **Recovery Time Objective (RTO)** and **Recovery Point Objective (RPO)**. There are disaster recovery concepts that can be followed that support SharePoint 2019. These concepts have not changed since SharePoint 2013 was in play, which includes standby recovery options, service application redundancy, and third-party solutions specifically for SharePoint:

- The RTO defines the time metric to calculate how quickly we can recover from a disaster. This would be the expectation the company would like to support as part of an **Statement of Work (SOW)**, which supports the service and is given to users or departments using the service. This is so that customers understand all the services provided and situations that may come into play within the environment.
- The RPO defines the point in which you would like to be able to recover. This means that the point of recovery could be a full SQL database backup time and maybe you also have a differential backup that was done later, combining these two backups, so overlaying the differential backup would then bring our point of recovery to a more recent time. This would be defined in the backup strategies, which we will talk about later in the book.
- **Standby recovery options** are provided using separate data center locations to house a system or service so that in the case of a service or group of systems that go down, those systems can be recovered and provide the service from a different set of servers or services. There are three different models for these options:

The first is cold standby, which is a data center that could be back online within hours.

The second is warm standby, which is a data center that could be back online within minutes or hours.

The third is hot standby, which would make the systems redundant, and if something were to happen, the users would not see much of a change in service. This would facilitate an almost-instant recovery, with some caveats of URL changes, DNS updates, and other networking configurations that could be automated or done manually.

- **Service application redundancy** can be configured when you configure services within SharePoint to be redundant as part of an outage, which would then require services to be running on hot standby servers. This is not a bad solution but we have to remember that SharePoint also brings with it a database side. In that case, we also must remember that we can also ship logs to another database server in another data center as well. This would push all database changes from the production farm to the DR farm in another location. These databases that support SharePoint can also be in read-only mode in the event that you do not want any changes to be made once failed over. This could come in handy in some scenarios.
- **Third-party solutions** come into play, and I refer you to AvePoint again as they provide some solutions that provide synchronization of content between locations and disaster recovery solutions just for SharePoint. If you have the funding, these are good to take a look at, but also remember that this comes at the cost of new servers to support the functionality and more time spent by your administrators managing these services as well.

Summary

In conclusion, the design of your SharePoint farm means everything to the support of the service. This means you cannot miss much when implementing a SharePoint farm. Making sure to document your infrastructure is key due to three things you will need now and in the future:

- Having a place to create, share, and save your design for review and changes
- Making sure you do not miss anything during the design process
- Giving someone else a chance to help, troubleshoot, and take over if you leave the company

Again, I cannot stress enough to document! I will say this many times in this book but documentation helps you figure things out because you write it out and don't just keep it in your thoughts. We admins tend to want to be smart off the top of our head but some things need to be written down. Don't keep things hidden in your mind; make sure to put them on paper. I have heard others who I have worked with always ask themselves why their team member doesn't know something, because it's obvious. Well, writing things down will make it even more obvious and get people working independently so that you don't have to hold their hand.

As part of that, always make sure to go through the scenarios when examining your current state. The assessment, best practices, and other planning information help to bring your design into a perfect scenario for your company. Remember that detail needs to be captured. Any little nuances, such as a custom port for incoming mail or as little as a service account used for a custom service – all these items need to be captured so that the design is understood. No one should be hunting you down for information or to see how things were designed.

We learned a lot in this chapter from the many angles that SharePoint has to offer. Some parts I didn't even touch upon. This chapter taught you a few things that will help you plan for success in many different scenarios. Although I didn't go too deeply into some of the areas I wanted to, this gives you a road map on where you need to go and what you need to focus on when designing and planning your architecture. Planning is everything and it creates the design for the farm as it answers many questions for you and your management. Always make sure to focus on planning as this is the *only* way to a successful SharePoint environment. There is no other way.

In the next chapter, we'll look at how we can go about creating and managing VMs.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. What standby recovery options would require some configuration to bring online?
2. What Microsoft Server product is used to support the development cycle and uses the three environments to help push and version developed code through those environments?

3. I can configure my SharePoint 2019 farm to use hostname site collections. True or false?
4. As part of our assessment review, what areas of our old farm should we be reviewing?
5. In our logical design, we should use one content database with a site collection and many subsites to support all departments in our company. True or false?
6. In our physical design, MinRoles play a big part in how we build service compliance in our server resources. Which MinRole is used for capturing a mix of services and has no compliance?
7. Should the help desk as a support resource field all SharePoint issues within the environment?
8. When designing our farm, what tier supports user connectivity?

3

Creating and Managing Virtual Machines

Creating a physical architecture to support your SharePoint 2019 farm starts with virtualization and setting up the servers needed to install all the software applications. In this chapter, we will see how to set up our Hyper-V environment using best practices and how to create redundancy using separate hosts. We will define server resources based on our requirements, finalize our configurations, and give guidance on how to maintain our hosts.

We will also discuss, as part of this chapter, understanding the importance of using Microsoft documentation as part of your installation and setup. Following best practices and Microsoft guidance is always the first thing you should do. Although it may not cover all the requirements, you will be able to find out what has fallen through the cracks. This will give you a baseline configuration to help you avoid any mistakes for the future of your environment, such as features, maintenance, and updates needed to support the environment.

We will also take a look at general changes in the Windows server over these past couple of operating system versions to make sure you are caught up and understand where Server 2019 is currently. Changes within the operating system can help you to use new features to support the environment to help bring you better use of your server features.

The following topics will be covered in this chapter:

- Creating hosts and VMs
- Defining needed server roles
- Installing Windows Server 2019 – host configuration
- Configuring Hyper-V Manager on Windows Server 2019
- Creating VMs

Technical requirements

For you to understand this chapter and the knowledge shared, the following requirements must be met:

- General understanding of Windows Server and **Active Directory (AD)**
- Experience with Hyper-V installation and configuration
- Experience with host installation and configuration
- Experience with **Virtual Machine (VM)** creation and configuration

You can find the code files present in this chapter on GitHub at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Creating hosts and VMs

When we start out trying to find the right hardware to support our SharePoint environment, we must have a SharePoint architecture as described in the first chapters of this book. If you have fully read *Chapter 2, Planning and Architecture*, you will recall that we looked at many scenarios to form an architecture for our SharePoint environment. We looked at our old environments, new features, changing features, and other aspects where there is a need for a change in strategies, such as Remote Blob Storage, so that we plan our new environment according to the needs of our users, administrators, management, and stakeholders, which is based on the current state and new requirements.

Host and VM configurations are the backbone of your server architecture and are the first step in starting to build a platform to support our farm. SharePoint runs well on hardware built to support it, as in any application, but the difference with SharePoint is that it covers many tiers and we need to think about those tiers as we look at starting our project implementation.

Some of your research should have already been completed as you should have already created a design document, but this doesn't mean we can't change a few things along the way as long as you **document**. We need to make sure to play our part in making changes and discussing these changes with other people on our team. Some of the areas that we may need to stop and think about in this portion of our implementation are the following:

- Server feature comparisons (which server is better for my needs: 2016 or 2019?)
- SQL Server version (which server is better for my needs: 2016, 2017, or 2019?)
- SharePoint Server version (which server is better for my needs: 2016, 2019, and/or Microsoft 365?)
- Third-party products, network products, and other data and backup integrations

Do not move forward until you have really finalized your choice of these supporting servers and you understand the differences. You don't want to go down the road of selecting a platform that doesn't support your future plans. You may see that a feature you need is not available in your version of operating system, AD, Exchange, SharePoint, or SQL. You may need a feature to support either an old application or new technology you were hoping to break ground with. Some of the differences in technology also come with added server resources, so make sure you are aware of those areas. Document all shortcomings, especially if you want to move forward with a product but you already know there is a hiccup in the support for the farm; just document this in the design document or in a separate document so that these items are noted.

The reason why I make this point is that there have been so many changes from SharePoint 2007 to SharePoint 2019 and the server platforms that support it, so it is possible that you may overlook some areas. Make sure you go back and look at the changes that have been made and ensure you are making the right decisions. Even some third-party products have areas that you wouldn't think of asking about, such as the product I have used for migration, AvePoint's FLY tool, which does not support SharePoint 2007. You want to make sure not to assume anything.

So, say you were building all this architecture to migrate from 2007 to 2019 and you thought you had the product to do it. Then, you get to the point where you need to use it and find out that it doesn't support your old environment. This would be a big loss of time because now you're back to square one trying to find a solution. One solution that still costs a lot of time would be migrating to 2010 first and then migrating to 2019 from that environment using the tool. This would take time because in SharePoint 2007, the main support was for classic authentication. When moving to 2019, you have to move to claims, so you would need to migrate to 2010 and update all the users from classic to claims and test. This could cause a major setback in the time spent.

So, my take on this is before you start, have a final discussion on these topics with your team and finalize anything you may need to move forward. Look at all aspects of the operating system, software, and third-party integrations before you move forward. This could be getting approvals on builds, approvals on funding, and other areas. You don't want to hold the project up because you didn't do enough research, so I am adding this point to give you a heads up to always do a second round of quick checking and research. This may take a week or two but it will be worth the effort in the long run to minimize time loss.

Server feature comparisons

There have been many changes to the Windows Server (Hyper-V) and SharePoint feature sets in the last two versions of these products. Since most of you reading this book will more than likely be migrating from SharePoint Server 2013, I think as part of this book we need to review the changes in Windows Server 2016 Server and those changes made within Windows Server 2019 to get a clear scope of the overall changes we need to be aware of.

It's important to understand what has been deprecated, what is no longer available, and those new features that have been added that may have even changed from the 2016 operating system version to 2019. Without this comparison, you may lose the functionality that you need to maintain your servers effectively as you would want. This gives you the opportunity to shop and look at other technologies as well. I am using Hyper-V as the example for this book because that is what 90% of my customers use for virtualization, and I use Hyper-V in my environment when setting up virtual servers as well.

Let's start our comparison by looking at Windows Server 2016 and looking at things that were changed from Windows Server 2012. This will give you a good baseline to work with to figure out which platform you want to use for your farm.

Windows Server 2016

If you have not had your ears open to all the changes that have been happening for the different Windows Server releases, here are some updates that you need to be aware of.

There are two support tracks for Windows Server: the **Semi-Annual Channel (SAC)** and the **Long-Term Servicing Channel (LTSC)**. The difference between the two channels is the following:

- **SAC:** Microsoft will release two releases a year for Server Core.
- **LTSC:** Microsoft will release feature updates every 2 to 3 years.

Here is a list of new Hyper-V features on Windows Server 2016:

- Compatible with Connected Standby
- Discrete device assignment
- Operating systems disk encryption support
- Host resource protection
- Network adapters and memory
- Hyper-V Manager improvements
- Integration Services
- Linux secure boot
- Support for resources
- Nested virtualization
- Networking features
- Production checkpoints
- Rolling Hyper-V cluster
- Shared virtual hard disks
- VM backup
- Shielded VMs
- Start order
- Storage **Quality of Service (QoS)**
- Configuration file format

- Configuration version
- Virtualization security
- Windows containers
- Windows PowerShell Direct

Windows Server 2019

Here is a list of new Hyper-V features on Windows Server 2019:

- Desktop Experience
- System Insights
- Server Core
- Windows Defender Advanced
- SDN
- Shielded VMs
- HTTP/2
- Storage Migration Service
- Storage Spaces Direct
- Storage Replica
- Failover clustering
- Linux containers
- Kubernetes
- Container improvements
- Network performance
- Windows Time service
- High-performance SDN gateway
- Delay Background Transport
- Memory support

As you can see, there are no real differences here but more additions in Windows Server 2019. I am only adding this information to let you know what changes were implemented in Server 2016 because you need to know these features as they are part of 2019 as well. In most cases, as I have stated in this book, you are moving from an older version of SharePoint, so you really need to understand what has transpired from version to version in your operating system as well as SQL and SharePoint. This will give you an overall understanding of what your systems have the ability to support.

When looking at features and areas to support our environment, we also need to define the roles needed within the farm to support the services. In the next section, we will talk about server roles and the importance of these roles in the environment.

Defining needed server roles

Creating hosts should be the first step in starting the process to build our VMs for the platform. This means we have already completed our assessment and have met with all teams working on our new architecture as well as finalized that architecture so that we can implement it at this point. Making sure you have your architecture is one thing, but we also need to look at environments.

Did we build environments to support DEV, QA, TEST, and production? If not, we need to do so now and we need to make sure we have addressed our support farms. These environments can weigh heavily on how our development and test process is defined for our environment. These other farms can also change the way our environments are secured and managed. These should all be separate environments with their own hardware, admin accounts, service accounts, and in some cases, AD, depending on your defined requirements.

Separation in these areas should be consistent with maintaining the validity of your migrations of code and content through testing those components before bringing them to the production environment. DEV environments are typically small, one-server environments that are managed one to one or developer to developer. You will need more VMs depending on how big the development team you're supporting is. If your team is medium to large for developers, you will want to spread out the resources using Team Foundation Server as the bridge to support the code developed in these cases.

Within our architecture, we must include a design to support redundancy, backup, and restore, build enough resources for performance concerns, as well as build a stable server architecture. The last thing we want in our host configurations is the possibility of error and downtime associated with misconfiguration or calculations of resources. The best thing to do is to take your time and figure out what resources will be needed to support your environment, especially looking at hardware types (Dell, HP, NetApp, EMC), rack space planning, networking equipment, and cabling. We also want to give some measurements to our installation by looking at server resources such as CPU, memory, disk space, types of disks, and disk speed.

When choosing server resources, make sure to look at and evaluate the speed of the hardware resources you choose. These choices make a big difference in how the server responds to processing and deals with memory, as well as the requirements for disk speed. The disk choice could be dependent on what those disks are supporting within your server resource. We could use an SAS drive for our operating system and partitions where you need the fastest response. There are also RAID configurations we could use for redundancy, such as mirroring and/or RAID 10, to make sure our data is always protected. Disk arrays have changed over the years and could be another investment you could bring to the table. These new technologies bring better ways to manage disk space along with the ability for enormous growth using connected hardware.

Logging may not be something we will need the fastest disk for, so we could take a hit on those resources and choose lower-speed disks. We could also use lower-speed disks to support backup file locations and record center locations where there is not much activity or user interaction. This takes planning, coordination, and documentation of those areas to support the configurations you are setting in this case. I can't stress enough in this book about documentation. If you're not already doing it, please start doing it on this project. It will save you a lot of headache and pain down the road.

In another vein, you may not need as much memory for a VM server in certain environments or use cases. I can tell you that I've been in a bad situation before when I used less than the recommended processor and memory for an Exchange and Skype implementation that I carried out in a test environment. It caused a lot of errors within my Outlook and Skype clients due to the server not having enough memory to process presence within the application. So, this can be very important depending on the application. If you have the resources to do so, do as Microsoft recommends because it can save you a headache.

So, let's take my environment as an example and look at all the servers I will be building:

- AD server
- Web frontend servers
- App servers
- Two SQL servers
- Exchange server

You could call this an evaluation, proof of concept, or DEV environment, so not many people will be using this environment. The support for users is very minimal, which means I do not need a lot of resources to really support a lot of overhead. My server footprints will be small and resources will also be minimal. So, when looking at our example, we will create servers that do not need many resources, but we want enough resources to support our environment from a best practice perspective. Please take into consideration that we are not building production in our examples.

When making decisions on hardware, always consult the manufacturer to make sure you are making the right decision. You will need to explain what your project is about and what you want to get out of the hardware you purchase. Tell them about any software you are going to use, in this case, SharePoint and SQL Server, and how many users you will be supporting.

If you believe your CPU will be your biggest worry, then do some research before your conversation; ask the manufacturer about any details you found, test the scenarios, and look at reports from old environments as well to make the best decisions going forward. Make sure you buy/create a server that can provide a better response to your environment needs and not take on the same issues you had in the past from a hardware standpoint.

In my environment, I am using a Dell R710 server and installing Windows Server 2019 to build my host servers. I am doing this to show the new advanced features that Windows Server 2019 offers. In that configuration, my hosts have five **Network Interface Cards (NIC)**, two eight core CPUs, 144 GB of disk space for my C drive, 2 TB of space for my VM locations, and 80 GB of RAM.

My environment has four host servers available and we will use two of the servers as SQL servers to support the database tier. SQL Server is the backbone of our SharePoint environment and we should not skimp on making this tier as strong as possible. For my other two hosts, I will use them as my SharePoint and/or web application tier. On this tier, any third-party applications can always be added as supported applications if needed.

We also need to make sure that as we build our servers, we also relate them to what application services we will be running on our SharePoint servers, especially using MinRoles. We will look into this more in *Chapter 4, Installation Concepts*, which will point out services we need to be careful with. Distributed Cache is one service where we need to be very careful with how it's configured, either as a MinRole as an individual server or accompanied by other services, and assign what resources it needs to run efficiently. MinRoles play a big part in what application services strictly run on a SharePoint server, so defining server resources goes hand in hand with our MinRole choices for our SharePoint servers.

In this environment, I will be using Hyper-V (because I am a Microsoft guy) to support the virtualization within the server builds. The host server will need to have dedicated server resources as well to make sure that the server can not only support the platform but also support itself as it needs resources to keep the server running and process any details used by the Hyper-V host. So, in our configuration, we need to make sure that out of the 80 GB of RAM and eight cores available, we set aside some good resources for our hosts. The host will not be working very hard in my environment because of the light user community.

So, let's get started with configuring our first host that will support AD!

Installing Windows Server 2019 – host configuration

To start our installation, please create a bootable DVD or USB to install Windows Server 2019. After doing so, reboot your system and choose the method with which you would like to start your installation. There are two ways to install Windows Server 2019: one is using Desktop Experience or a GUI interface, and the other is Core, which is all command-line driven. We will use the GUI interface because this is the default interface supported by SharePoint 2019.

The checklist of items we need to create our hosts is the following, and these items should be documented as a best practice for the support of the environment:

- IP addresses for the servers
- Server naming conventions
- Admin and service accounts
- A network supporting the servers
- ISO for installation of Windows Server 2019

- Licenses for *all* product installations
- Any company policy-related configuration details
- Any security policy-related configuration details
- Access to any custom server builds related to your company's policy

Again, to start the Windows installation, use a shared mounted DVD or mounted shared USB or folder. Once you have inserted the media, you will see the Windows setup screen, and then you can take the following steps to start the installation of Windows 2019 Server:

1. Click **Next** to continue the installation:

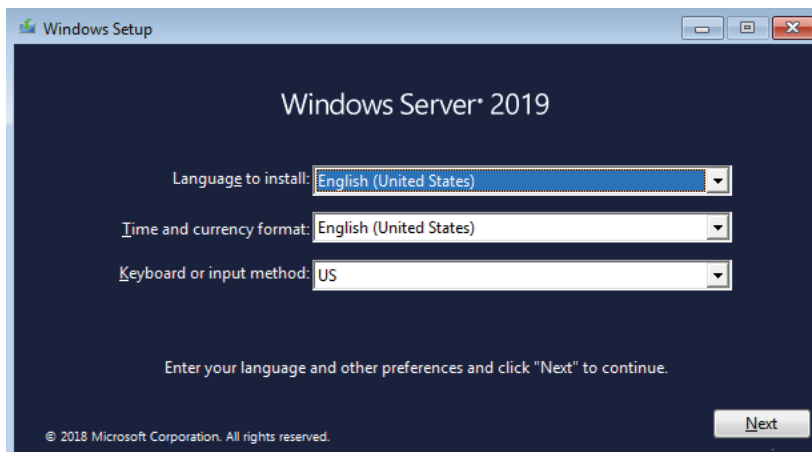


Figure 3.1 – Windows setup screen

2. Click **Install now** to continue the installation:

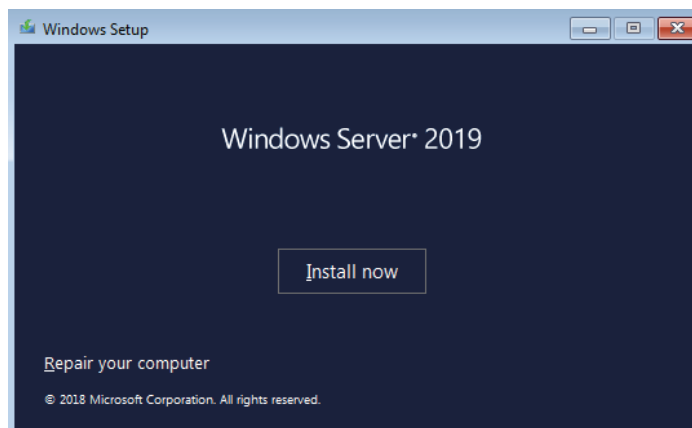


Figure 3.2 – Installation splash screen

- Click **Next** to continue the installation, choosing the desired operating system you would like to install:

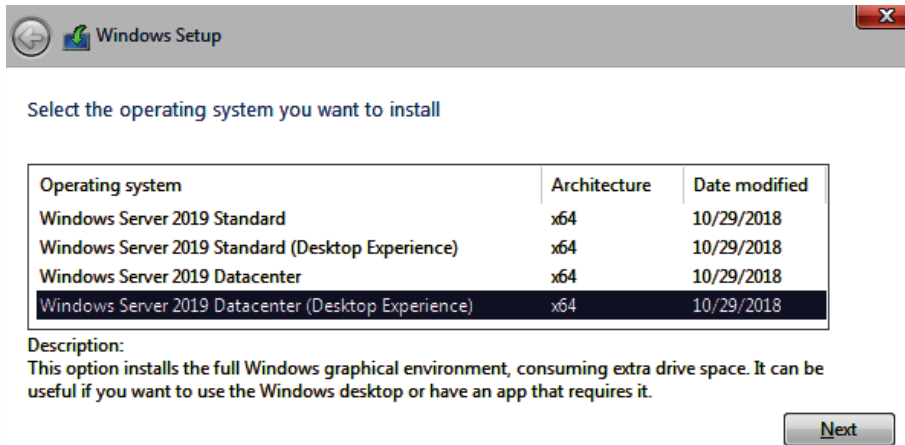


Figure 3.3 – Operating system choices

Note

Standard (Desktop Experience) supports small, virtualized environments and **Datacenter (Desktop Experience)** supports highly virtualized and cloud-based environments. The choices without **Desktop Experience** are core, which is supported using the command line only.

- Click the checkbox and then click **Next** to continue:

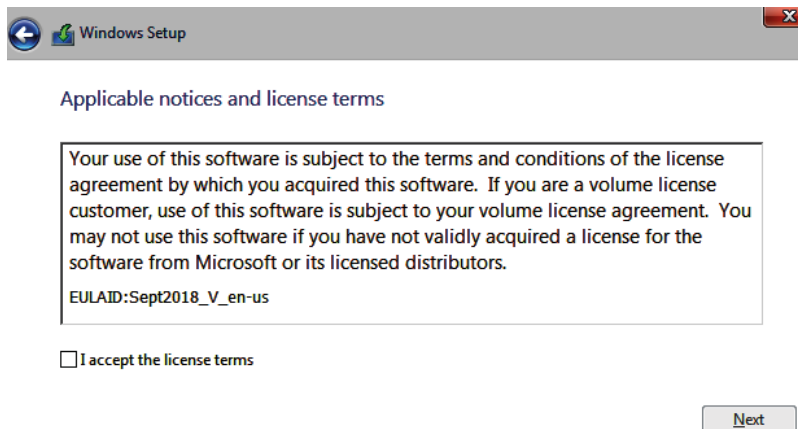


Figure 3.4 – Accepting the license terms

- Click **Next** to continue the installation (you may have many drives here and some may need formatting – use the tools as needed):

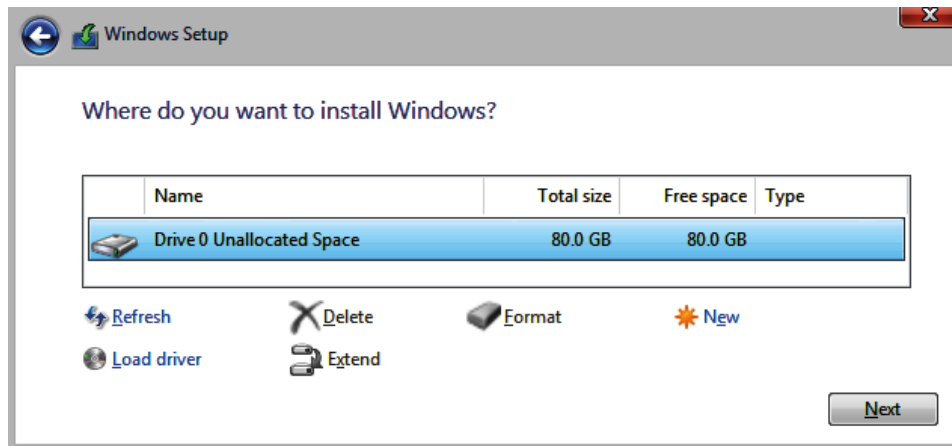


Figure 3.5 – Selecting a drive for installation

- Wait for the installation process to complete:

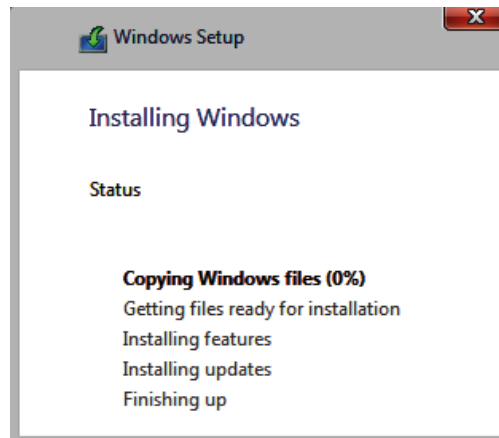


Figure 3.6 – Progress of installation during setup

7. After your server reboots, you will be prompted to supply a password for the administrator credentials:

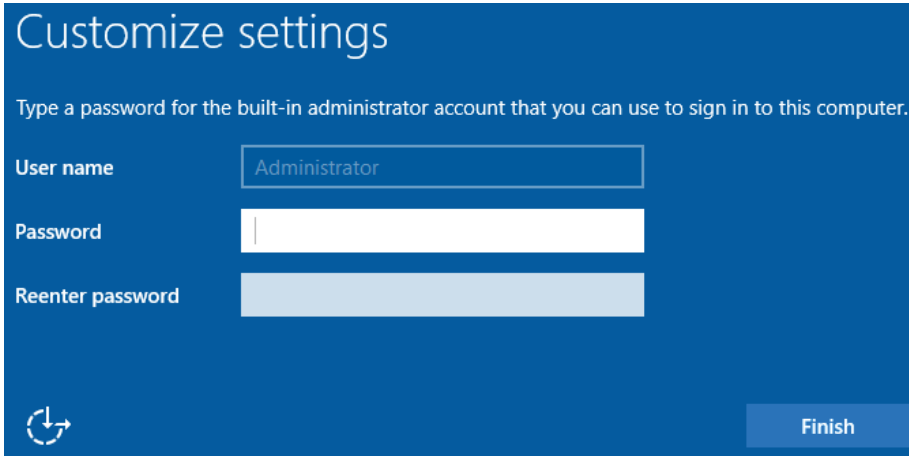


Figure 3.7 – Supply your credentials here

8. Wait for the installation process to complete and you will see your desktop.

We have completed our installation of Windows Server. We will now configure our network and server names for the servers that will support our farm.

Configuring the network and server names

Make sure to update the IP address, server name, and domain before you start the installation! Let's look at the steps to start configuration:

1. On the desktop, press *Ctrl + Alt + Delete* to log in to the server with your admin account.
2. Click the start button to pull up a list of available options. Choose the file manager.
3. Right-click on **This PC** on the Windows menu and choose **Properties**:

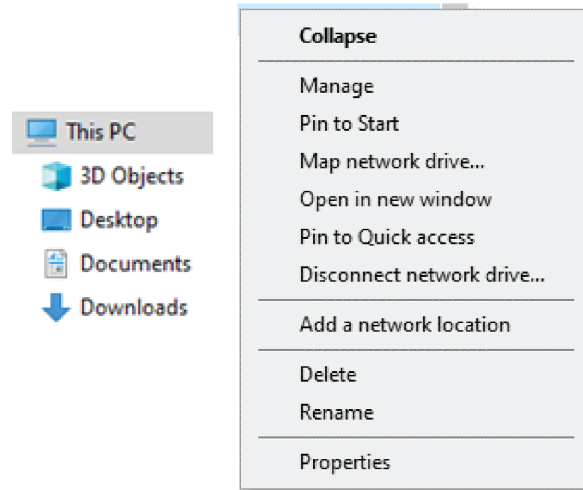


Figure 3.8 – Right-clicking on This PC

Change the server name to the desired name and change the settings.

This window will pop up to show the system properties:

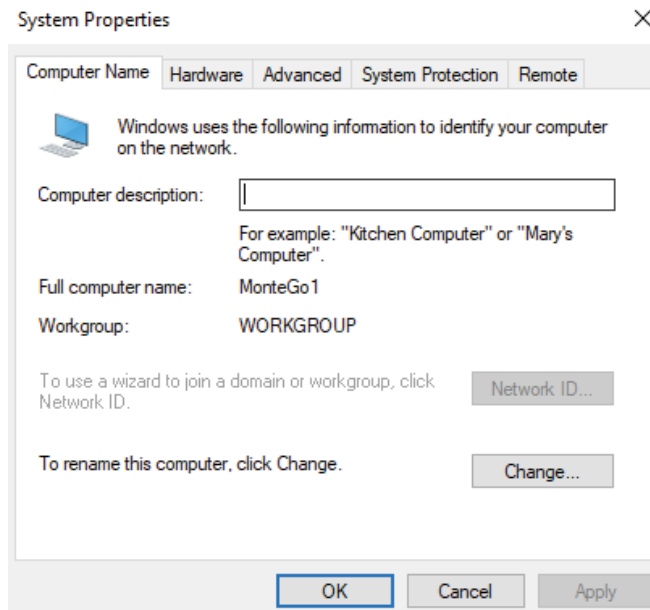


Figure 3.9 – System Properties

4. Click the **Change...** box to change the server name:

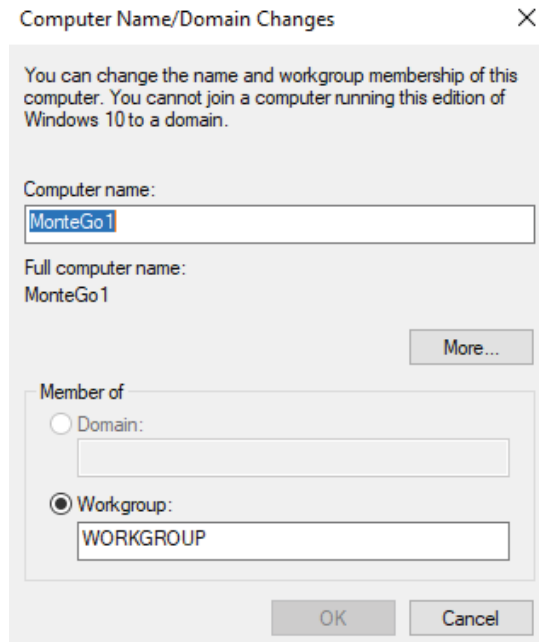


Figure 3.10 – Changing your server name

5. Click **OK**. Then, reboot the server and your server name will be updated.

Configuring network and internet access

We will start the configuration of network resources on our server at this point in our installation. This will include network configuration, which you will need to finish this configuration. Please have the IP addresses of your gateway, servers, and subnet mask and follow these steps:

1. Once the server is installed, go to **Control Panel** and choose the **Network and Internet** feature. Next, select **Network and Sharing Center**:

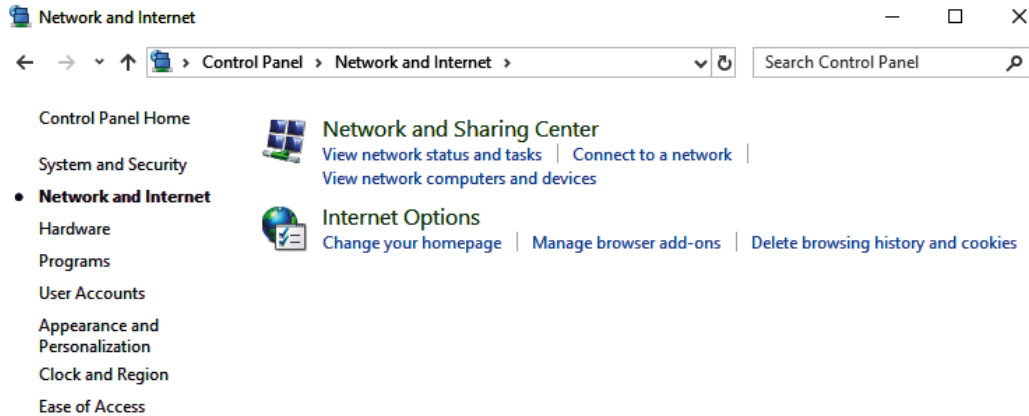


Figure 3.11 – Network and Internet in Control Panel

2. Click on **Change adapter settings**:

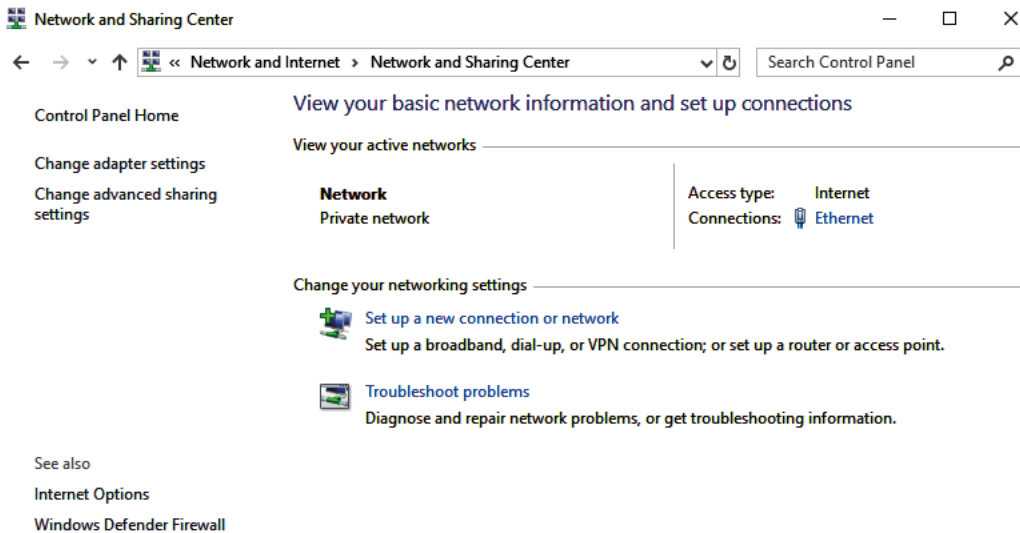


Figure 3.12 – Network connection view

3. Right-click the Ethernet connection you would like to configure and choose **Properties**:

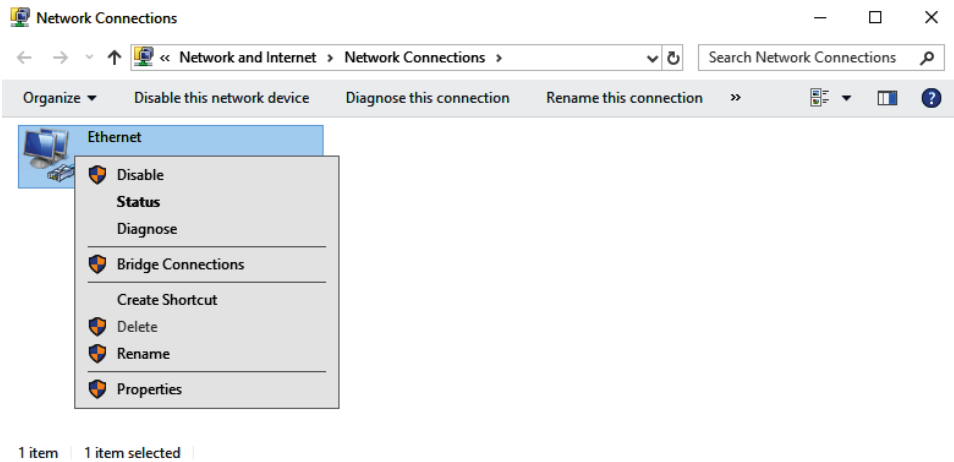


Figure 3.13 – Navigating to the properties of your Ethernet connection

4. Choose **Internet Protocol Version 4** and click **Properties**:

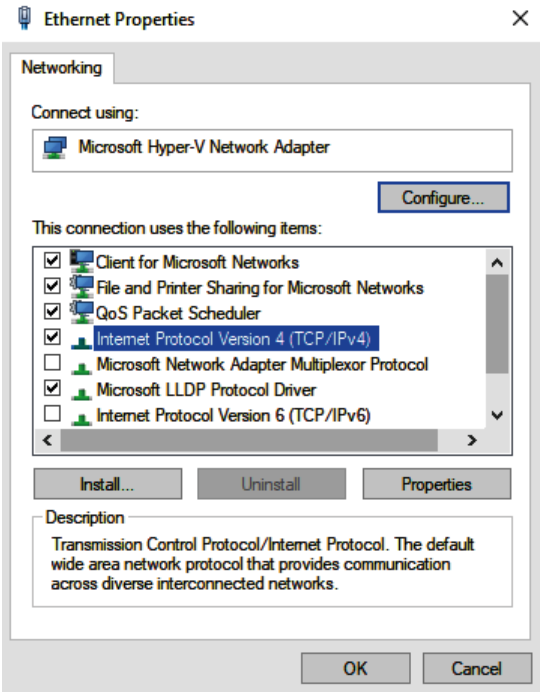
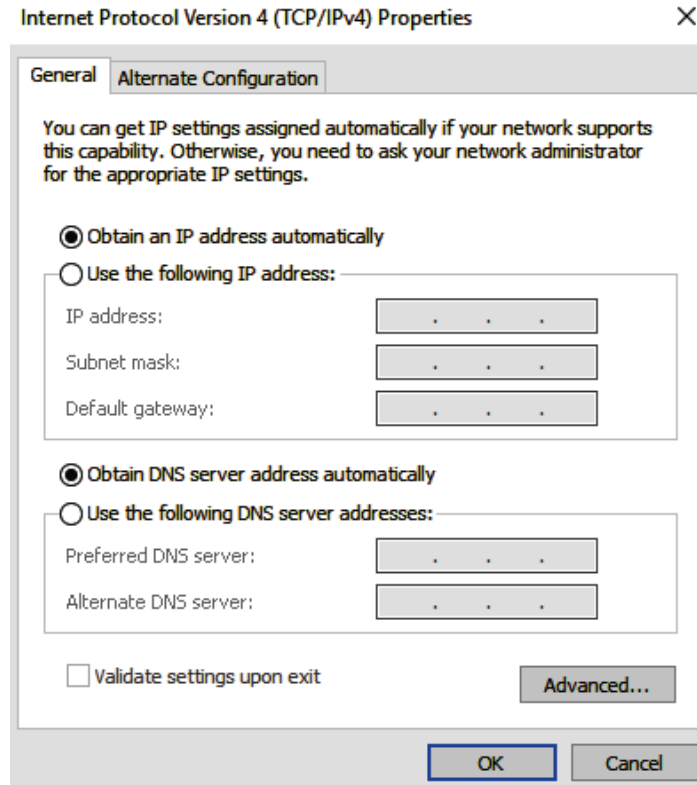


Figure 3.14 – Selecting properties

5. Select **Use the following IP address**. Insert your static IP address for this server, the subnet mask, and the default gateway. Also, enter your preferred DNS server and alternate DNS server addresses. Then, click **OK**:



The screenshot shows the 'Internet Protocol Version 4 (TCP/IPv4) Properties' dialog box. The 'Alternate Configuration' tab is selected. The dialog contains instructions about automatic IP assignment and two main sections for manual configuration. The first section, 'Use the following IP address:', has three input fields for IP address, Subnet mask, and Default gateway. The second section, 'Use the following DNS server addresses:', has two input fields for Preferred DNS server and Alternate DNS server. There is a checkbox for 'Validate settings upon exit' and an 'Advanced...' button. The 'OK' button is highlighted with a blue border.

Figure 3.15 – Inserting the required details on this screen

Networking is set up for the server now and you will now be able to see the server on the network and browse the internet if the server is connected to the internet. Again, you can also add configurations for NIC teaming, which is more advanced and can easily be found on Microsoft's website.

Adding the server to the domain

Once you have set up networking on the server and you are able to access other resources from the server, we need to add the server to the domain. The domain is essential in centralizing the server farm to use the same authentication method for the farm. This is also given as SharePoint using AD for authentication.

Remember that in SharePoint 2016, AD is the only method of authentication supported. As in older versions, **Forms Based Authentication (FBA)** and other methods are supported out of the box. You will need to use Microsoft Identity Manager to configure those methods for use within SharePoint Server 2016.

To start adding the server to the domain, follow these steps:

1. Go to **Control Panel** by typing `control panel` in the run or search area of the desktop. You can also find **Control Panel** by clicking **start** as well.
2. Add the domain name you will use in your environment (this should be the name of the AD domain created for your farm) and the correct server name in the **Computer name** area of the form:

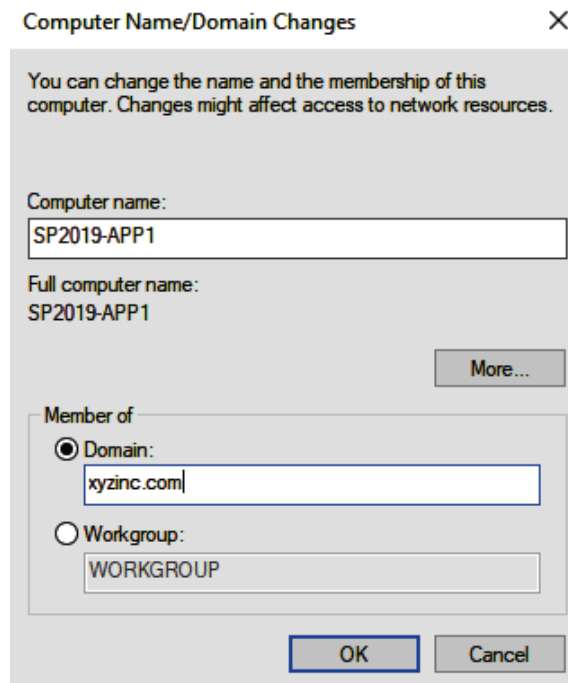


Figure 3.16 – Updating the domain

3. Type in the domain admin account and password and click **OK** (if you do not get this screen and get an error, please check your DNS, and even rebooting may help at this point):

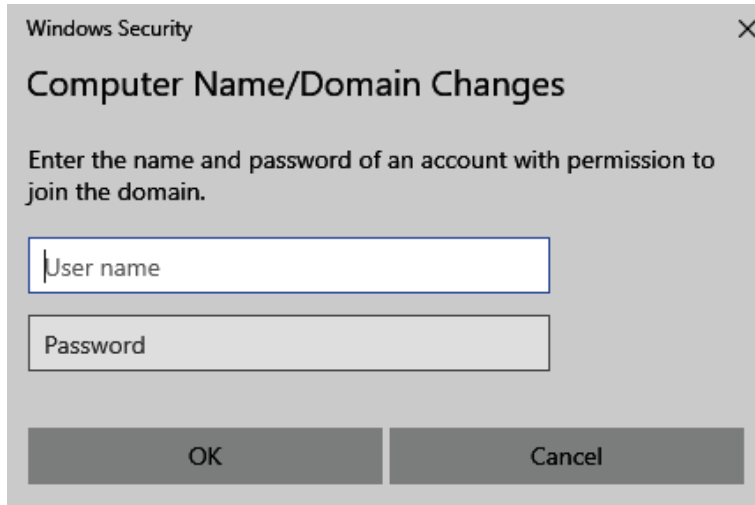


Figure 3.17 – Entering the username and password

4. Click **OK** on the welcome message screen:

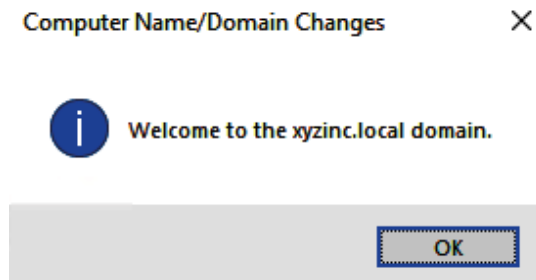


Figure 3.18 – Welcome screen

5. Reboot your server!

We have now added our new server(s) to the domain. Repeat these steps as needed within the configuration of your servers. Now that we have our host established, installing Hyper-V is next on our list to be completed.

Configuring Hyper-V Manager on Windows Server 2019

There are two ways to install Hyper-V on Windows 2019 Server. One is through PowerShell and the other is through the GUI using a visual approach. In my view, it doesn't matter what you use. Although PowerShell is a very powerful set of tools to know and understand, you can get the same results through the GUI in most cases. I know that some admins choose to run everything in PowerShell and don't want to use the GUI, though.

To me, either of the two can get the job done in certain aspects of administration. PowerShell is more powerful and scripts make life easier, so you have to weigh up the benefits of the two. The GUI should be used by beginners so that they understand the platform before venturing down the PowerShell road. I use a mix of both the GUI and PowerShell in this book so that I can cater to both beginner and intermediate admins and others who just want to understand the platform.

To get a basic understanding of Hyper-V networking, there are some areas you may want to research to get more insight into the application. I have provided a list of research terms for you to look up to dig deeper. As we can't cover all of these topics in this book, knowing these terms can at least point you in the right direction:

- Hyper-V virtual switch
- Hyper-V working with DNS
- The OSI model for Hyper-V virtualization
- VLANs and Hyper-V configuration
- Hyper-V teaming
- Hyper-V and load balancing
- Hyper-V storage

If you would like to use PowerShell to install Hyper-V, make sure before running PowerShell that you start the process to get Hyper-V installed and that you are running it with elevated privileges in the GUI-mode installation. You must run as an administrator to run these commands successfully:

- The PowerShell command is as follows:

```
Install-WindowsFeature -Name Hyper-V  
-IncludeManagementTools -Restart
```

- Install Hyper-V with **DISM (Deployment Image Servicing and Management)** as follows:

```
dism /Online /Enable-Feature /FeatureName:Microsoft-Hyper-V /All
```

If you want to see the installation visually, then take the following steps:

1. Open Server Manager from the desktop of your server by searching for **server manager** or click the icon for Server Manager in your start window. Select the following option and click **Next**:

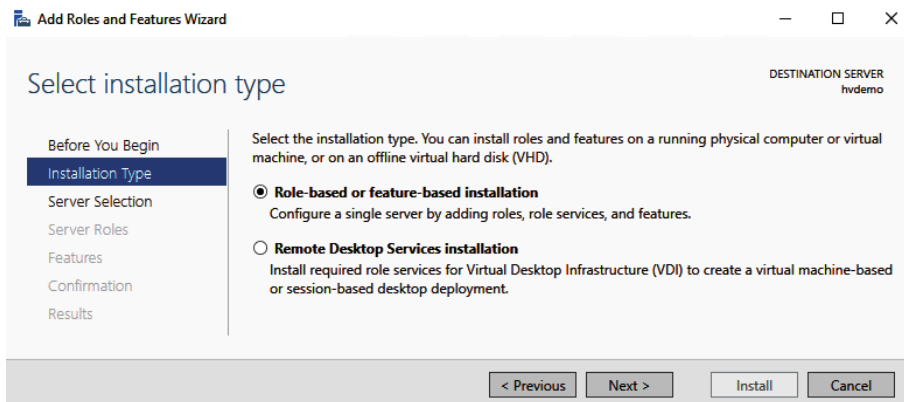


Figure 3.19 – Selecting Installation Type

2. Choose the server and click **Next**:

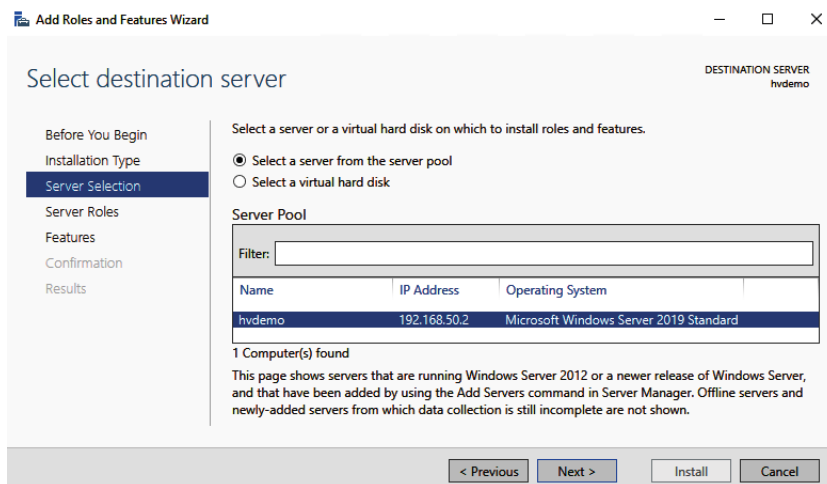


Figure 3.20 – Selecting the destination server

3. Select **Hyper-V** and click **Next**:

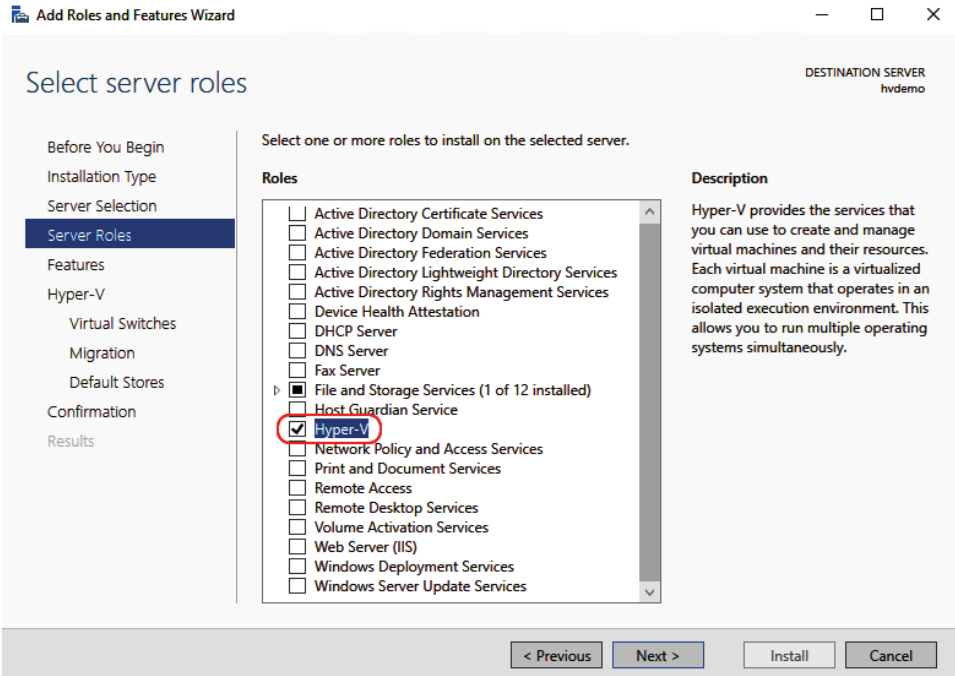


Figure 3.21 – Selecting the server roles

4. Click the **Add Features** button, like so:

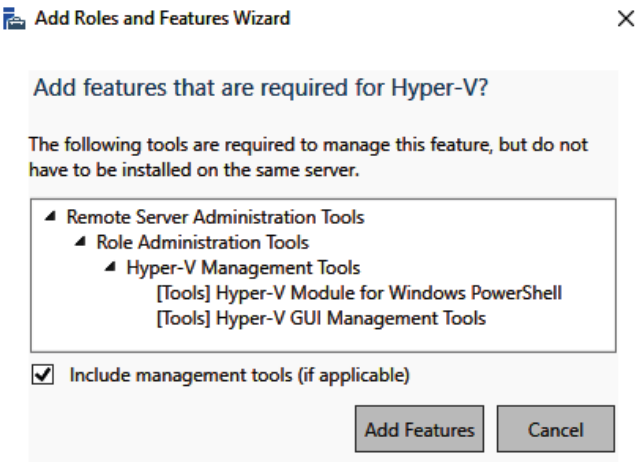


Figure 3.22 – Adding features

5. Make sure to check all the Hyper-V roles, as shown in the following screenshot:

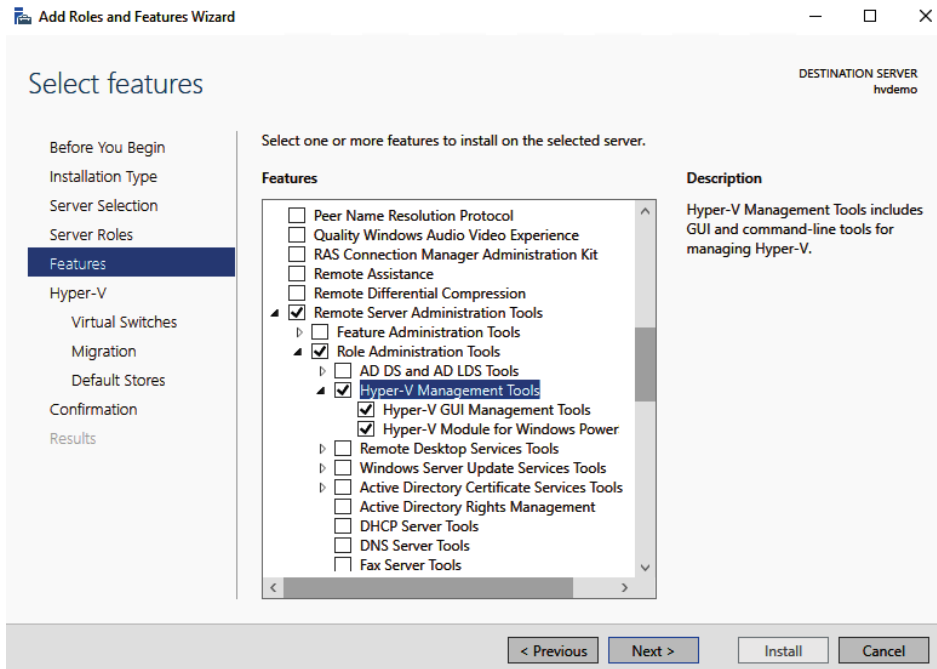


Figure 3.23 – Hyper-V roles selected

6. Click **Next** once you have read the page that explains Hyper-V workloads on VMs:

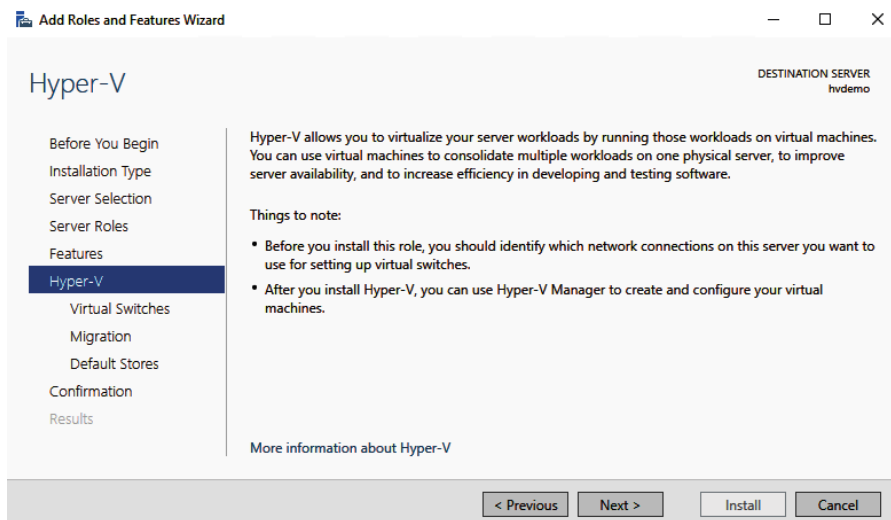


Figure 3.24 – Explanation page

7. Select the **Ethernet** network adapter and click **Next**:

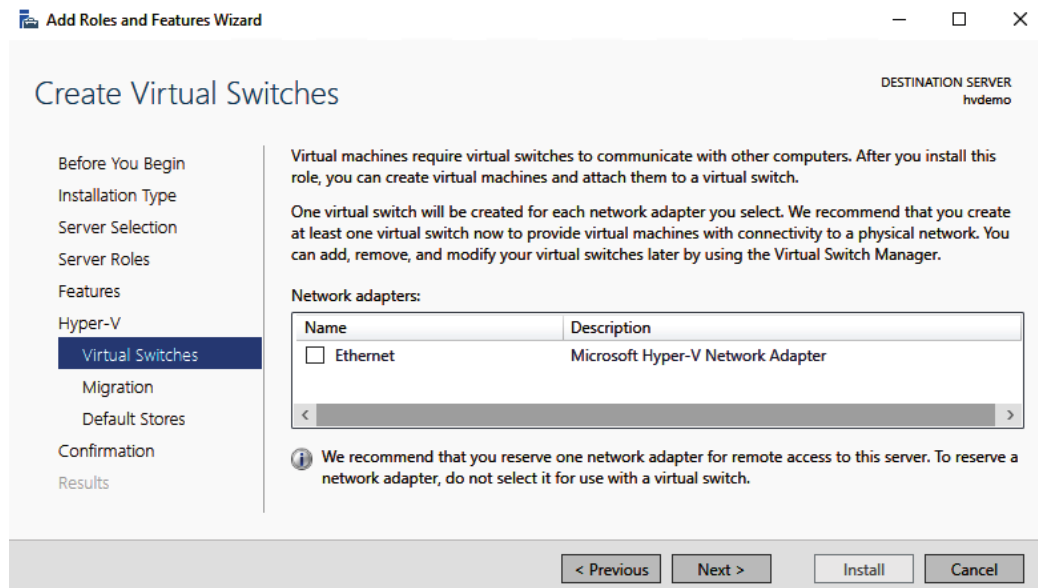


Figure 3.25 – Creating virtual switches

8. In the **Migration** selection, make the selection depending on whether you will be using the live migrations features available within Hyper-V:

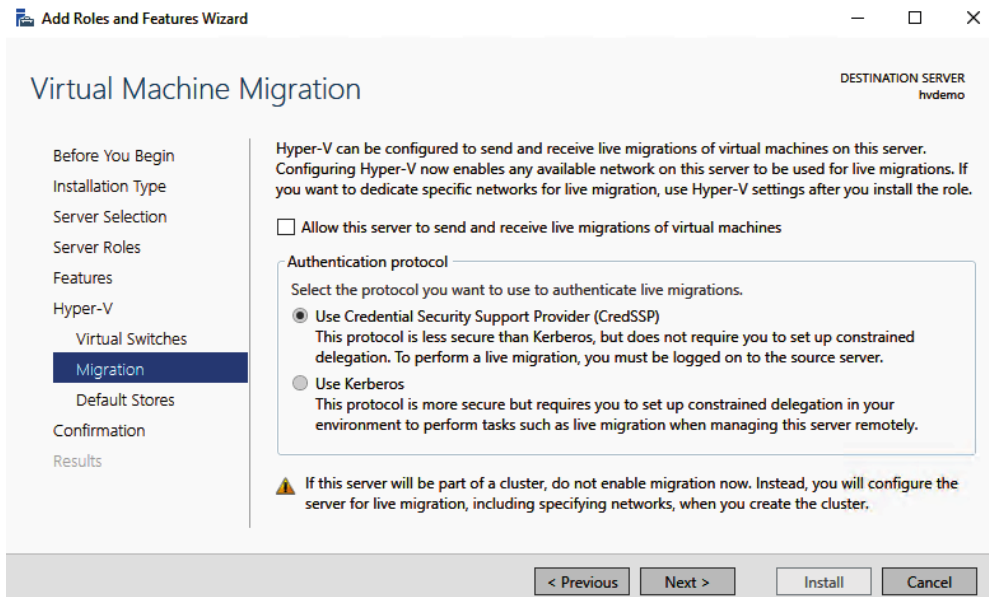


Figure 3.26 – Selecting security

9. Select the default locations for hard disks and configuration files. Choose a location that can grow, not your operating system disk. Once you have added a location for each option, click **Next**:

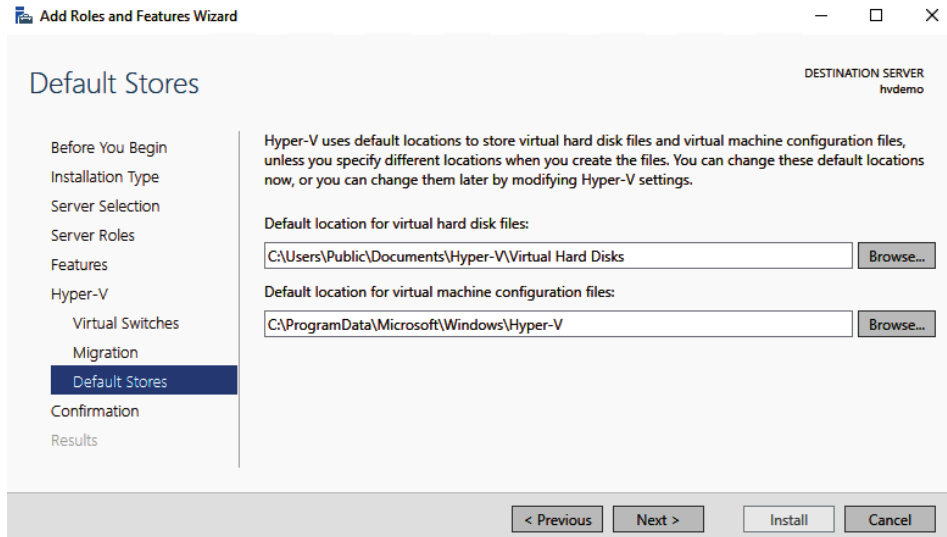


Figure 3.27 – Selecting the default locations

10. Click **Install**:

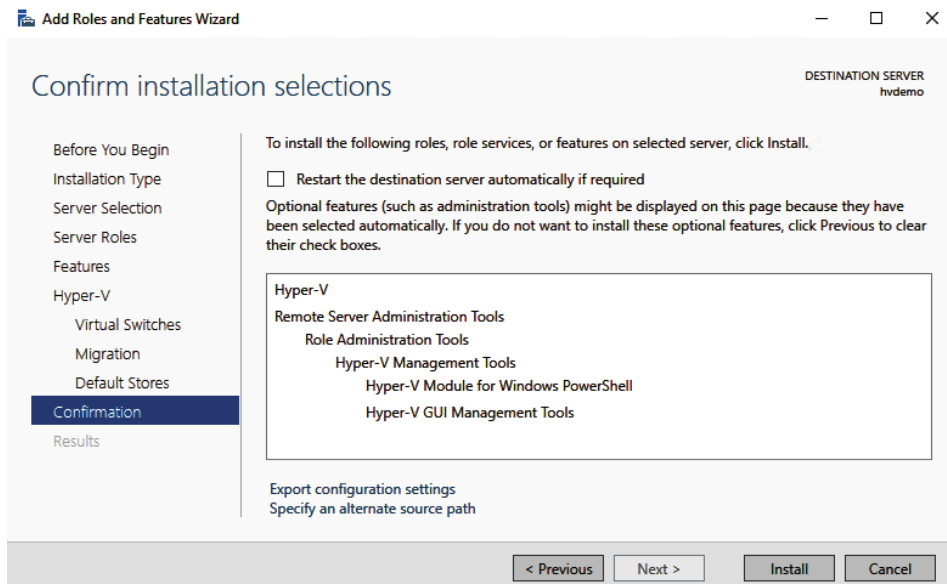


Figure 3.28 – Installation confirmation

When the process completes, **reboot** your server!

Hyper-V advanced post-installation options

Hyper-V used within Windows Server 2019 is a great product and Microsoft continues to build on the server technology by requiring very little post-installation configuration, which was needed in prior versions of the server technology. I will list some of the things you want to check before getting started with using Hyper-V, but from my standpoint, this installation was pretty rock solid.

As for networking, these areas should be addressed as a post-check of the Hyper-V installation depending on the configuration needed within your environment.

The host networking configuration requires the following:

- Create adapter teams.
- Create a virtual switch or create a switch-embedded team.

Note

These concepts only work in Windows Server 2016 and 2019 and are not supported in earlier versions of the Windows operating system.

As for the overall host configuration, please review this list of checks to make sure you have the locations and settings in place. If you are using live migration, please refer to those items that should be evaluated before starting to use Hyper-V:

- Configure the default virtual configuration storage location.
- Configure the default virtual disk storage location.
- Configure the live migration security settings.
- Configure the live migration performance settings.

There are also commands and other areas of Hyper-V that can be set through the command line and cannot be seen in the GUI. Please look through the list of cmdlets available to you and do some research. You may find that you need to use some of the available cmdlets to configure the Hyper-V configuration further. To list the commands available for Hyper-V, use the following command:

```
Get-Command -Module Hyper-V
```

PowerShell is powerful! Make sure you learn to use it as you go through this book to open your mind to more ways to administer the SharePoint farm and servers in the farm. Most administrators use PowerShell to manage everything.

Now that we have our server host configured, we can create VMs to support the resources needed within the environment.

Creating VMs

Since we now have hosts to create VMs, we can start the process of creating VMs to support our farm.

The checklist of items we need to create our VMs is the following:

- IP addresses for the servers
- Server naming convention
- A network supporting the servers
- Hosts configured for resources
- ISO for installation
- A list of the admin and service accounts with passwords created in AD

The VMs that we will be creating are listed here:

- AD (if you do not already have it)
- SharePoint servers based on MinRoles
- SQL Server
- Office Online Server
- Workflow Manager
- All the installation prerequisites
- Any PowerShell scripts

Creating our first VM

When creating our first VM, we want to locate the Hyper-V VM manager on our server. Let's take a look at how we can do that:

1. Once opened, right-click the server name and select **New | Virtual Machine...**:

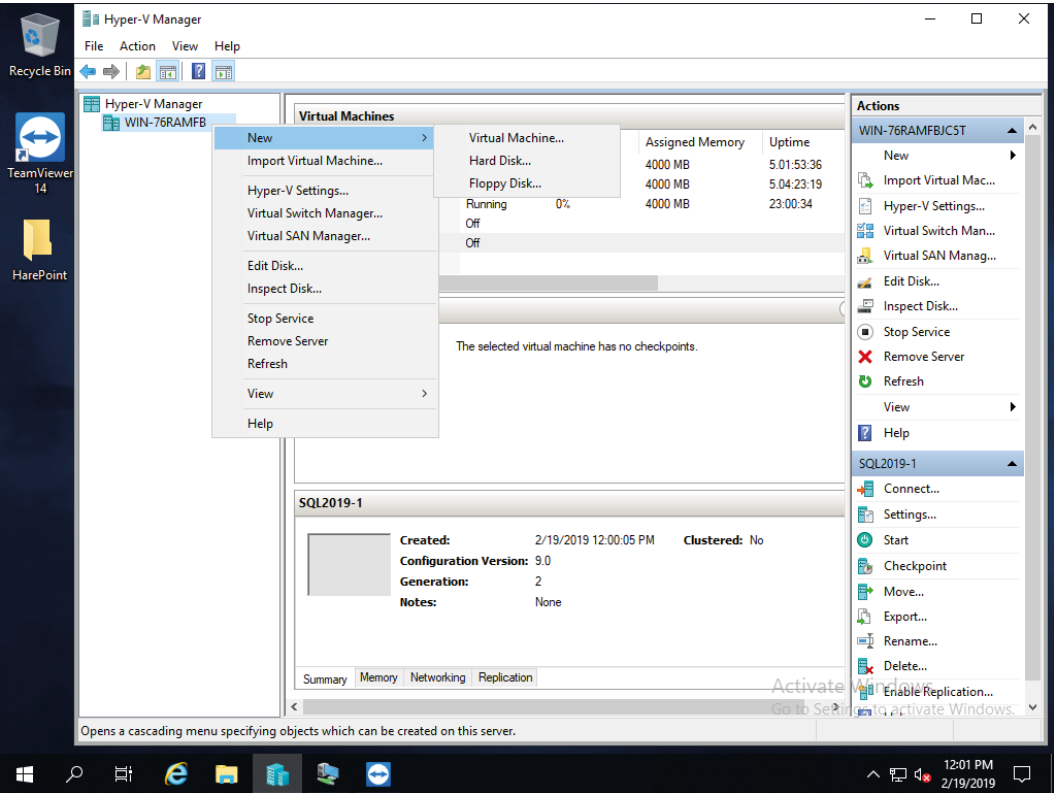


Figure 3.29 – Hyper-V Manager

2. In **Specify Name and Location**, type in the name of your server and browse to select where your VMs will be located on your server. Click **Next** after reading the information about the creation wizard:

Note

This should be storage you have set aside on separate drive space; please avoid using the C drive!

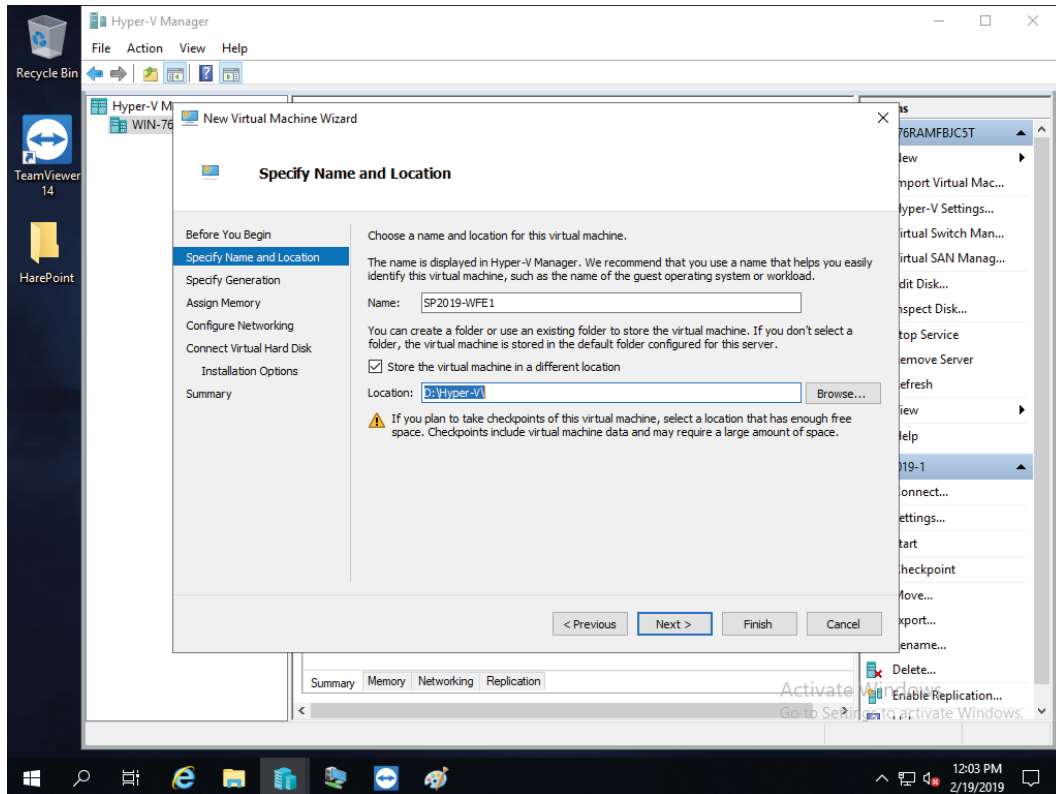


Figure 3.30 – Specify Name and Location

3. Select the generation of server you would like to use as part of your farm. For the latest and greatest features, please select **Generation 2**:

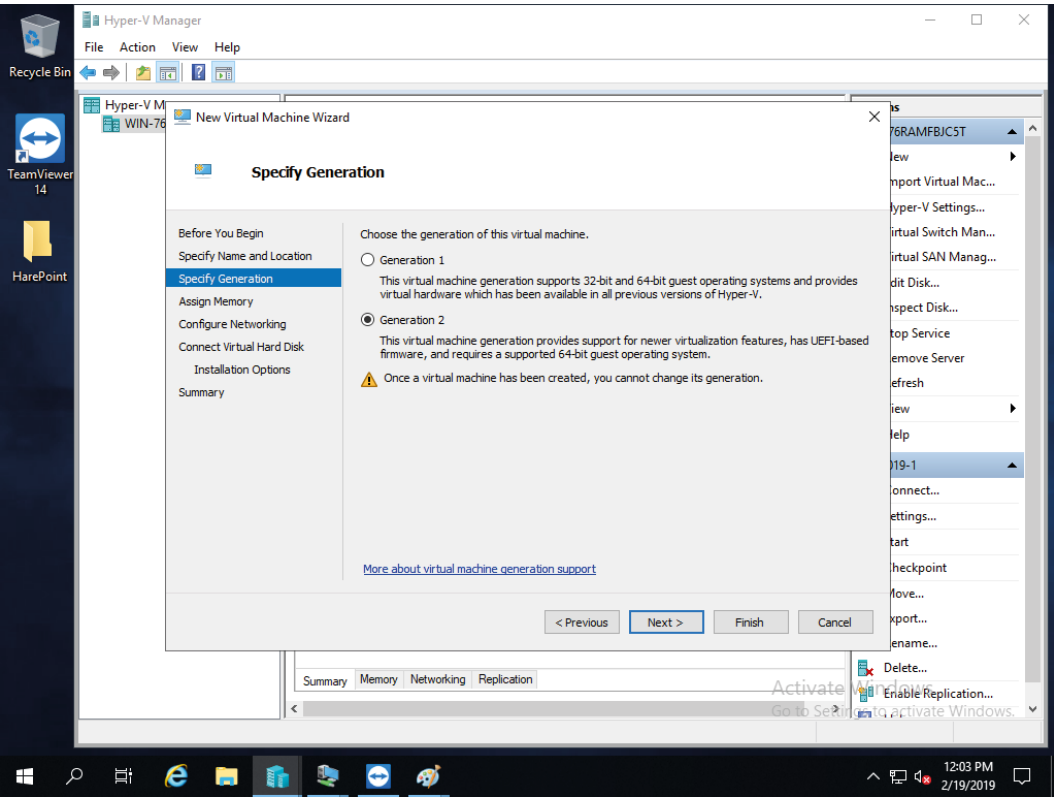


Figure 3.31 – Specifying the generation

4. Select the amount of memory you would like this server to use for support of the farm:

Note

Please do not use Dynamic Memory! This is not a supported feature for the support of SharePoint environments. You will not be supported by Microsoft if you were to call in for support.

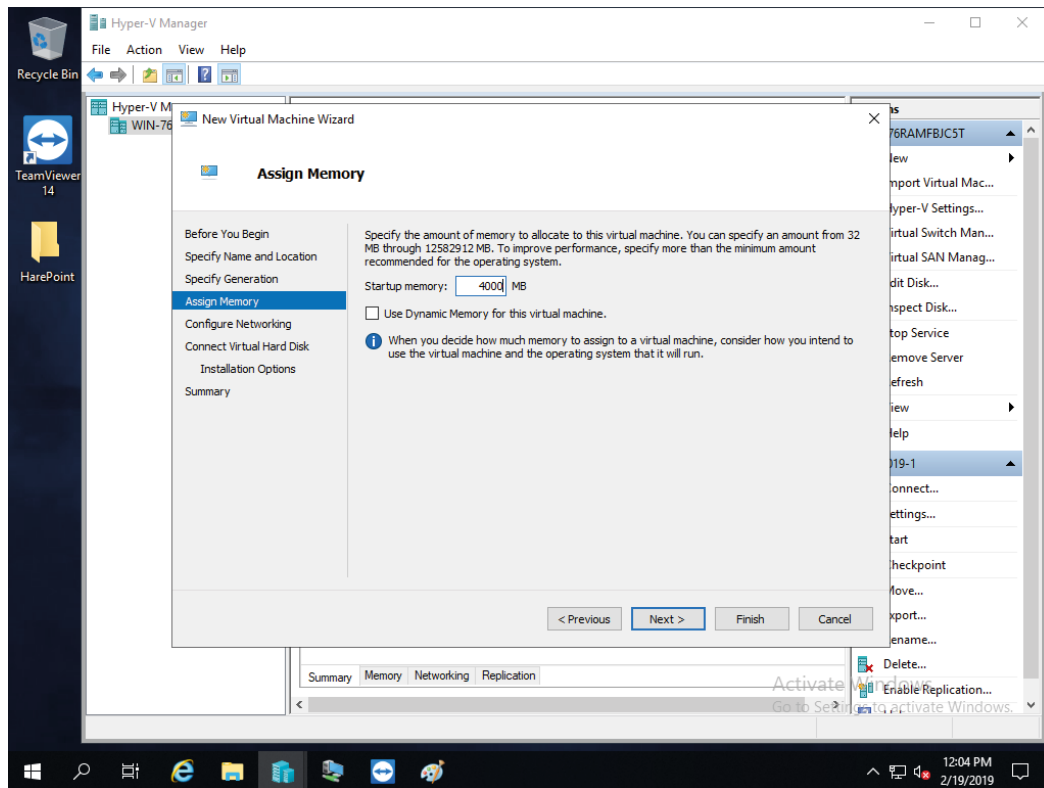


Figure 3.32 – Assign Memory

5. Select the network adapter you would like to use for networking configuration:

Tip

You can always change this later by using NIC Teaming or both a switch with NIC teaming. This is just a demonstration of the basic functionality to get you started.

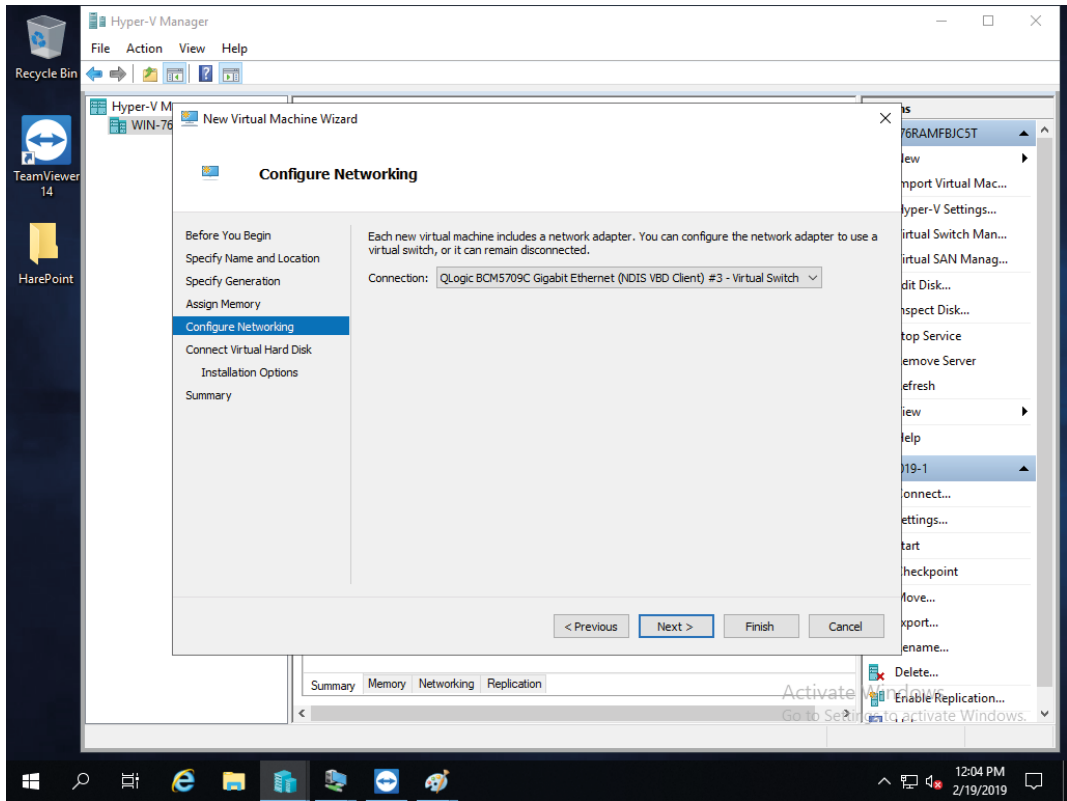


Figure 3.33 – Configure Networking

- The name of the server file for the VM is shown, as well as the location of the VM and the amount of disk space you would like this server to have for its first drive:

Tip

Refer back to your drive configurations in your design document to make sure you build your server correctly.

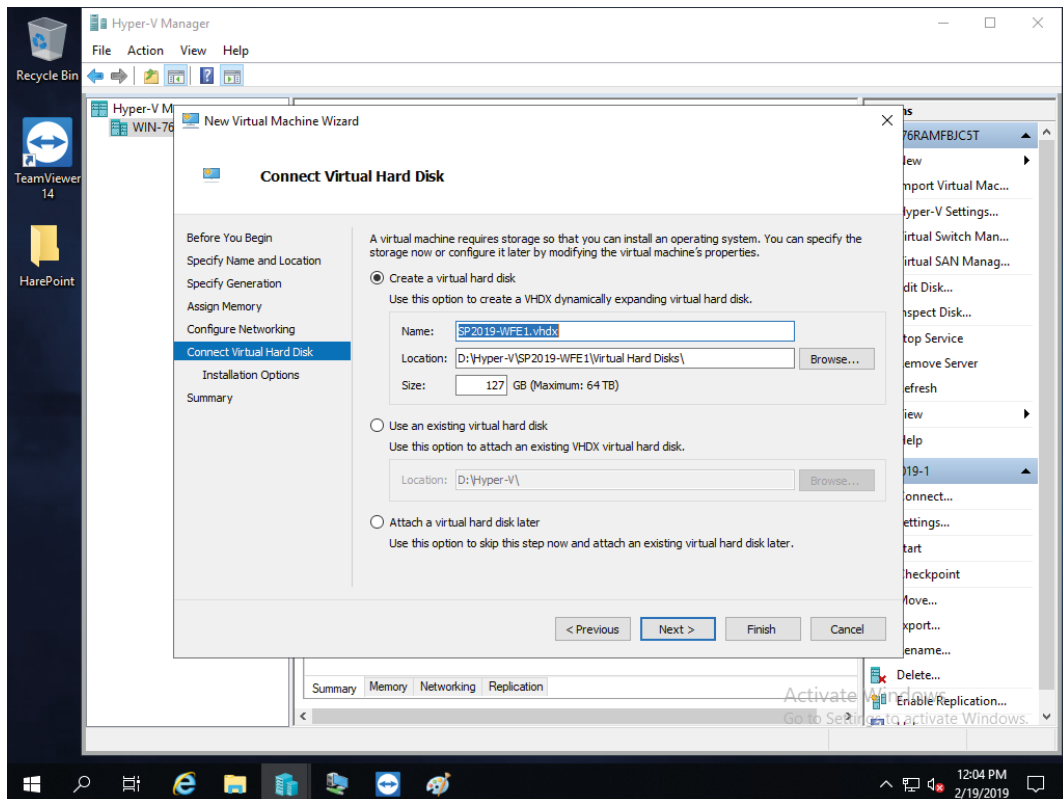


Figure 3.34 – Connect Virtual Hard Disk

7. If you have an ISO image or a DVD of the installation for Windows, please connect it here using the **Browse...** button. If you are just creating the servers, then you can install the operating system later as well:

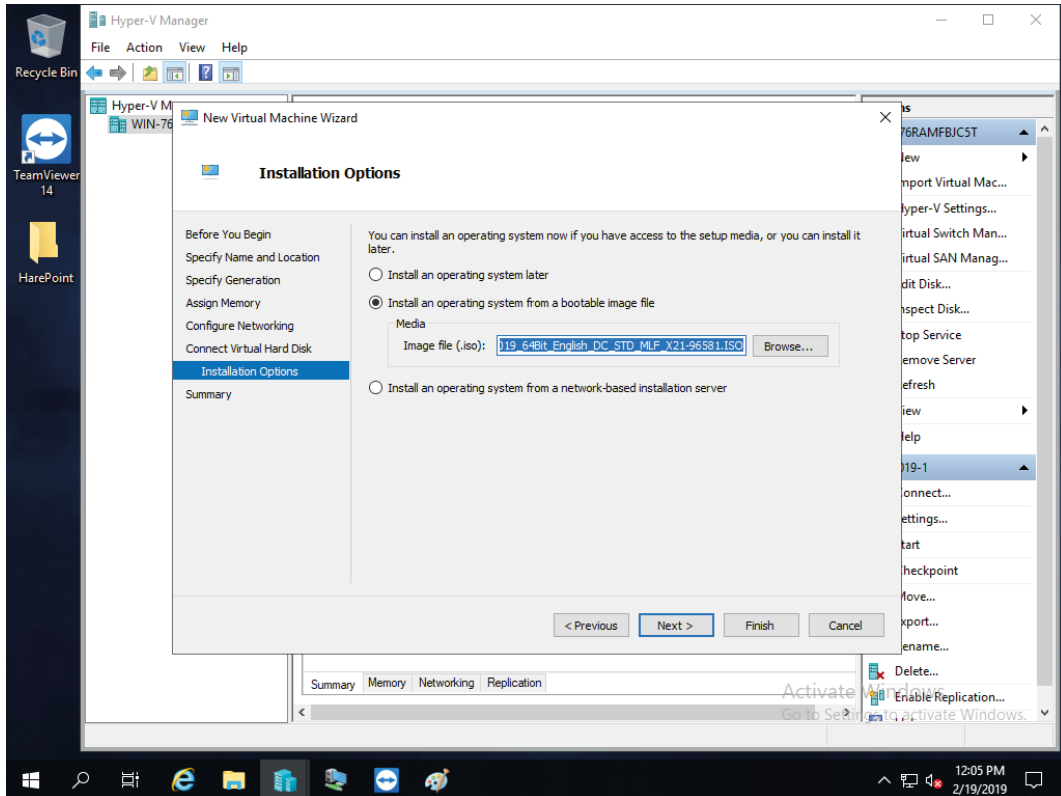


Figure 3.35 – Installation options

8. Complete your server configuration by clicking **Finish**:

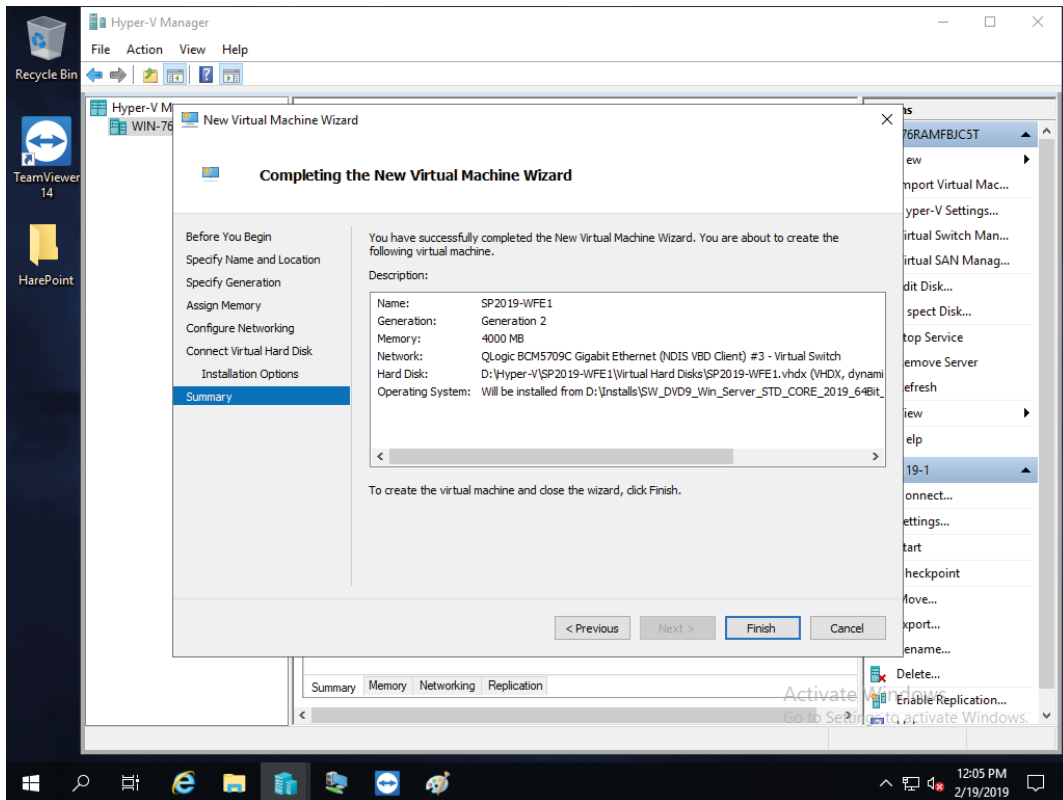


Figure 3.36 – Completing the New Virtual Machine Wizard

Note

This allows the VM to connect to resources on the host computer very easily and even allows drag-and-drop files. This is with Generation 2 VM servers and Windows Server 2016 or 2019 only!

9. Once completed, go back and click on **Integration Services** and select **Guest services**:

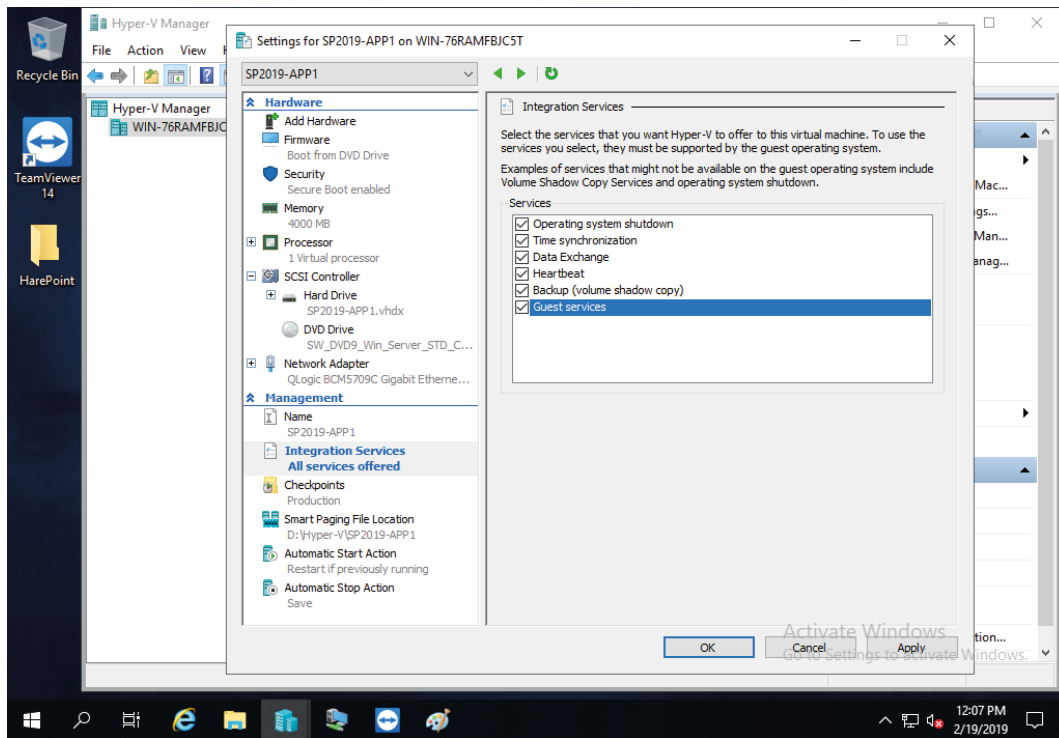


Figure 3.37 – Selecting Guest services

10. Start the installation by choosing your language and keyboard method. Click **Next**:



Figure 3.38 – Choosing a language

11. Click **Install now**:

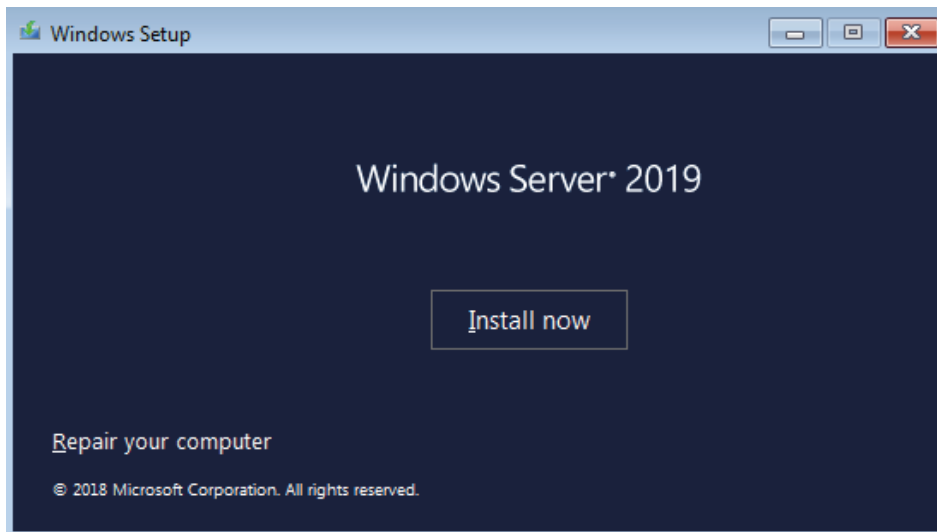


Figure 3.39 – Installation screen

12. Choose the Windows operating system version and experience you would like to use for the server:

Tip

Remember that for all SharePoint servers, you will need to use the Desktop Experience installation. SharePoint does not support the core installation.

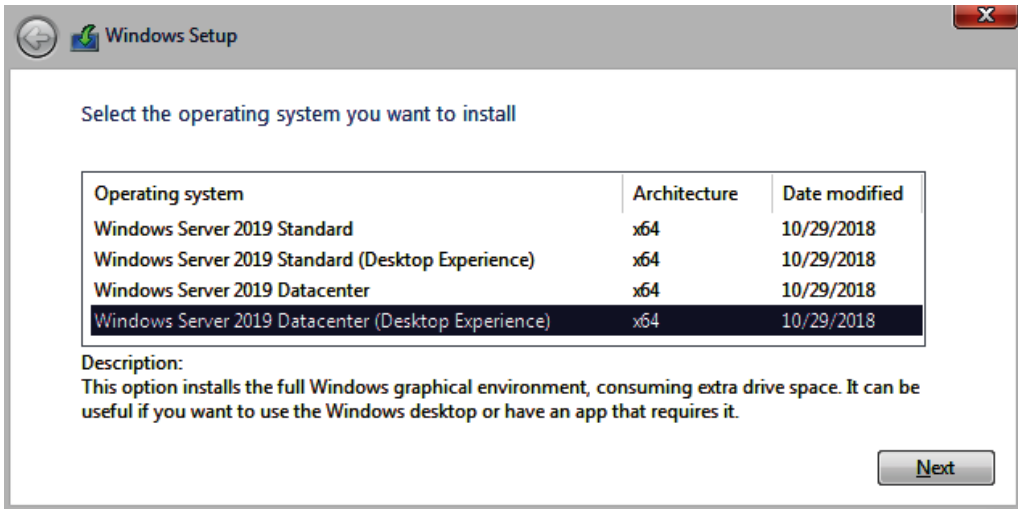


Figure 3.40 – Selecting the operating system to install

13. Click the checkbox to accept the license terms and click **Next**:

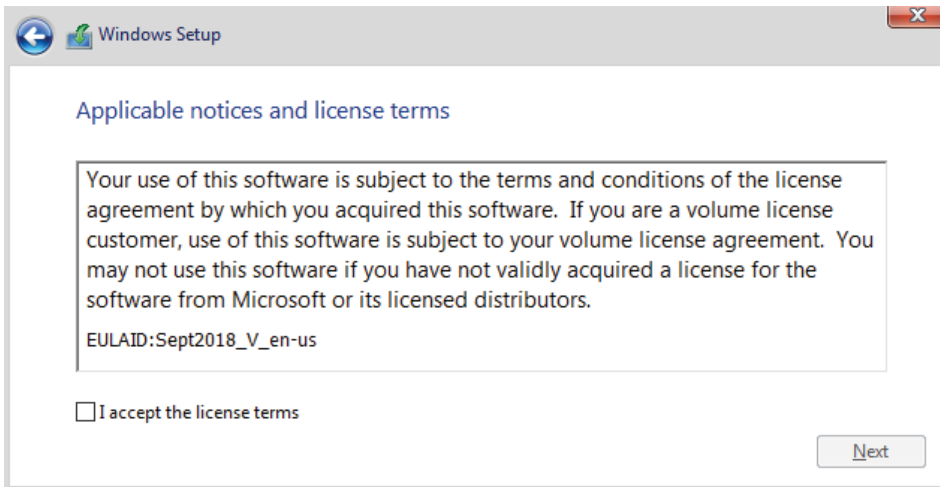


Figure 3.41 – Accepting the terms

14. Choose the drive you would like to install Windows Server on and click **Next**:

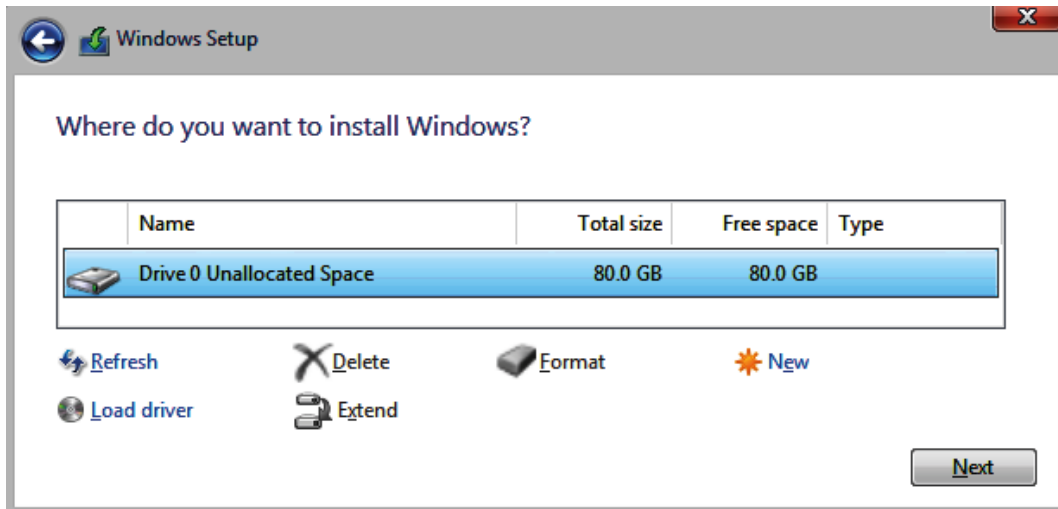


Figure 3.42 – Selecting the install location

You will see the Windows Server in-progress screen:

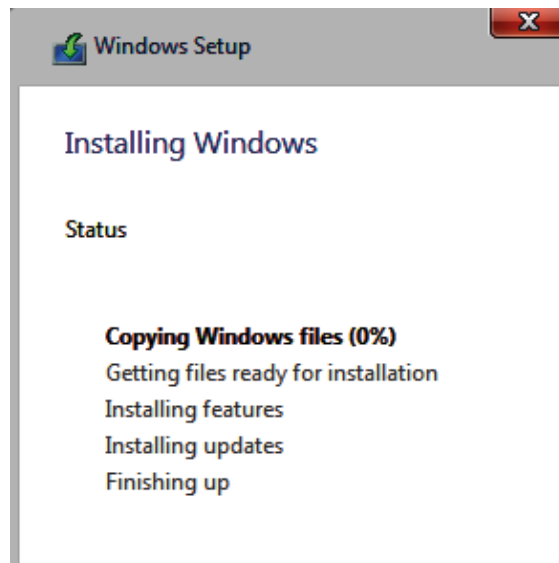


Figure 3.43 – Installation in progress

Windows is processing the installation:

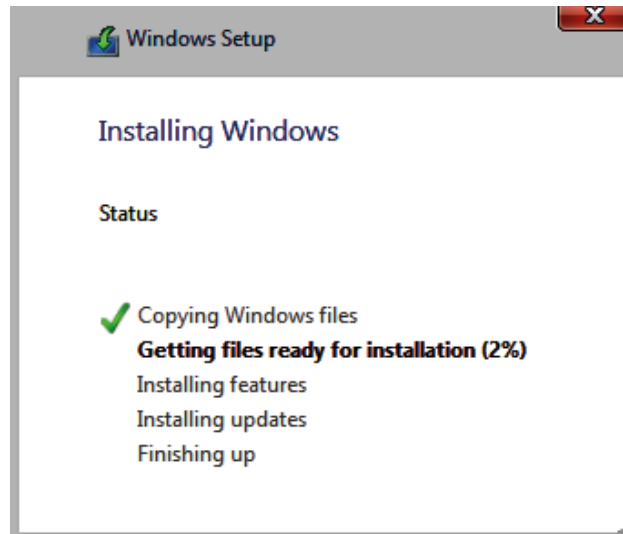


Figure 3.44 – Progress screen

Finished! You have set up the first VM server on your Hyper-V platform.

Repeat these tasks to set up all your server VMs for the farm, including adding the server to the domain and any other areas covered in this chapter. The servers you plan to install in support of the environment should all use the same configurations on the VMs. Make sure you add one set of servers to one host and the other set to another host for support of redundancy.

Summary

In this chapter, we covered a lot to create the basics of the SharePoint platform. We learned about creating VMs and configuring the host to support the SharePoint resources supporting the platform. We also covered the differences between operating systems and how they have changed over the years in terms of features and support of the environment. Make sure that you understand these details because they will tailor the way that your environment is configured and managed going forward.

Do not under resource your host or VM servers. Make sure you have plenty of disk space and memory to support the environment. Also, remember that dynamic memory is not supported on SharePoint servers. This has changed since the Distributed Cache service was introduced. If you call for Microsoft support, they will not support you with VMs configured in this manner. Don't make mistakes from the beginning. With the low cost of server components, this should not be a limitation any more.

If you really apply yourself in these details, there is much more to research, as you can see from the notes I have provided in this chapter. Please make sure to research the topics I have covered and get a clear understanding of Hyper-V and the technology using the GUI for configuration – and, of course, PowerShell. Do not skip this as a step in your learning as PowerShell is a key way to manage servers and I suspect that it will be the only way to manage servers and cloud resources in the future.

It takes time to learn but, at the same time, it is not rocket science. Do not be intimidated because the more time you spend on it, the better you will be at managing servers with no GUI or visual aspects. Always remember to test your scripts before you run them in a production environment. This is why I have stressed in this chapter and the book to create DEV and TEST environments so that users are not impacted by mistakes. This also applies to SharePoint as there are PowerShell cmdlets for that platform as well. Move toward it openly and embrace its power.

In the next chapter, we will start our installations and do some pre-installation tasks to finalize our server configurations.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. What is the difference between the choice of a Standard Desktop Experience and the DataCenter Desktop Experience?
2. The data location for your VMs should be managed on the same drive as your operating system. True or False?
3. When creating the host and VM servers, should you use DHCP or a static address to configure IP addresses for your servers?
4. What are the main three environments we need to have to support our SharePoint development processes ultimately? Why?
5. How do MinRoles relate to server resources?
6. Can the Distributed Cache service be affected by the configuration of your VM?

4

Installation Concepts

In this chapter, we will discuss SQL and SharePoint installation concepts and how to craft installations to fit the requirements your team is trying to build to support the infrastructure. In my travels, I have seen instances where many companies did not pay much attention to these initial steps on how the farm was installed, which later made it difficult to make changes in the infrastructure. We must take into consideration the different versions of software we should be using to make our infrastructure and project successful by implementing features that support our final build goals. Your server resource platform, as well as the version of the software, plays a big part in the infrastructure requirement efforts you are trying to support.

During our build, we must also pay attention to the configuration settings that also come into play to support the users in your community as these settings can make a difference in how the farm supports user requirement efforts. Some settings also play into how we recover from the disasters and hiccups we may face in our farm when the farm is in production use and available to our users.

In this chapter, we will go through the installation and configuration of SharePoint and SQL Server. The issues we have seen in most installations take the form of botched configurations. Looking closely at assessment reports from many different SharePoint farms and SQL Server instances will help bring up some obvious points in this book to help you avoid some pitfalls in the future.

We will also expand on some points that admins and others may gloss over as a non-issue at the beginning because they do this as part of their installation process. From what we have seen, we believe that most of the topics covered in this chapter need to be reviewed as there could be something you might have missed.

The following topics will be covered in this chapter:

- Installation updates
- Configuring SQL Server 2017
- Configuring SharePoint 2019 prerequisites
- SharePoint 2019 installation

Technical requirements

For you to understand this chapter and the knowledge shared, the following requirements must be met. Please review these points to ensure your understanding:

- Installation and configuration experience in SharePoint 2007/2010/2013/2016
- SQL Server experience with installation and configuration

You can find the code files present in this chapter on GitHub at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Let's get started!

Installation updates

We can see a different installation and evaluation process for the new versions of the Windows operating system, SQL, and SharePoint. In this section, we will go through initial installations of SQL Server 2017 Enterprise and SharePoint 2019 Enterprise to show you the step-by-step process of these new installations and point out the new and notable areas to key in on.

When we were writing this book, we really wanted to make sure to get the point across about changes. The reason why we mention this several times in this book is that a lot of you will be coming from a different version of SharePoint to upgrade to SharePoint 2019. So, we want to make sure to cover these areas well as some of you may be skipping versions of SharePoint, SQL, and operating systems to move to new Microsoft applications. Skipping over versions like this requires some research and there will be things you need to understand.

Some of the things in this installation that we need to talk about again are as follows:

- SQL Server and SharePoint do not coexist on the same server in this version.
- SharePoint 2019 only supports these versions of SQL Server: 2016, 2017, and 2019.
- SQL Server Express, SQL Azure, and SQL 2017 on Linux are not supported.
- Windows Server must be installed using Server with Desktop Experience.

As part of our configuration, we are required to use one of these server operating systems:

- Windows Server 2016 Standard or Datacenter (Desktop Experience)
- Windows Server 2019 Standard or Datacenter (Desktop Experience)

For the current installation scenarios, you can refer to the following site: <https://docs.microsoft.com/en-us/sharepoint/install/hardware-and-software-requirements-2019>.

Use one of the following operating systems:

- Microsoft SQL Server 2016 RTM Standard or Enterprise edition
- Microsoft SQL Server 2017 RTM Standard or Enterprise edition for Windows

A list of admin and user accounts needed for the installations of SQL and SharePoint is as follows (could be more depending on your needs):

- **SPAdmin:** Admin account to manage the farm, mainly used for Windows and SharePoint updates
- **SPFarm:** Farm account for the farm
- **SPSearch:** Runs the search application service
- **SPWebApp:** Runs the web applications in the farm; sometimes good to use separate service accounts in some situations
- **SPCTWTS:** Claims to Windows Token Service account needed for this service
- **SPService:** Service account for all services
- **SPPProfile:** Runs the User Profile service in the farm
- **SPUPSREP:** For User Profile service connectivity to **Active Directory (AD)**
- **SPCacheWrite:** Cache account for the web application that has full control access
- **SPCacheRead:** Cache account for the web application that has read-only access

Now that we have looked at the installation details, let's move on to the configuration details.

List of configuration details

Now that we have created servers for our farm using the methods from *Chapter 3, Creating and Managing Virtual Machines*, we need to make sure we have done a check of our list of items that we will need during this process:

- AD domain installation complete.
- NIC card has been set on all **Virtual Machines (VMs)** with static IPs.
- All drives have been added to the servers created (second drives for SharePoint servers).
- Admin and service accounts are created.
- All servers have been connected to the AD domain.
- All admin accounts are added to the servers as local admins.
- List of service accounts and passwords.
- License keys for products being installed.

As you can see, this list is short and I am sure there are more items you could need during your installation. There are other items that I could have missed due to my environment being a demo of a basic configuration and not a more secure and sophisticated farm.

In the next section, we will go through the installation of SQL Server 2017 and break down the installation concepts based on requirements.

Configuring SQL Server 2017

The foundation of SharePoint is SQL Server. The database server holds all the data related to your SharePoint installation. SQL Server 2019 is also available for us to test during this proof of concept installation. There are big differences in the two versions of SQL due to updates in the 2019 version that support big data.

Let's talk about the differences for a minute to get you up to speed on SQL Server 2016, 2017, and 2019. SQL Server is supported if installed on the same server as SharePoint 2019. SQL Express is not supported as an automatic installation to support your single server installation. In production environments, we like to see SQL on a separate server for performance reasons.

Installation of SQL Server 2017 can be done on a new platform, which is exciting to see. Linux is now a platform that will support SQL Server 2016, 2017, and 2019, which you can now run on the Linux operating system. What does this mean to me? This could mean a lower cost for operating system licenses and also, Linux is known to be more stable than Windows (depending on who you talk to), so this could give you some benefits of moving your databases to a Linux server.

The installation prerequisites are as follows:

- The SQL admin account has been added to the local administrator group.
- All service accounts have been identified for supporting the installation.
- Local policies have been configured for the SQL admin account.
- Turn off your firewall or configure the port configuration.

Local policies for SQL Server service accounts are as follows:

Name	Description	Local User Rights	Domain Rights	SQL Permission
SQLInstall	Account to install SQL.	Local Administrator... on the SQL server	Domain user	Permission will be assigned when SQL server is being installed on the SQL Server.
SQLUser	This account is for running the following SQL Server services: MSSQLSERVER, SQLSERVERAGENT.	Bypass traverse checking, log on as a service	Domain user	Permission will be assigned when SQL server is being installed on the SQL Server.

Figure 4.1 – SQL Server service accounts

SQL Server Windows Firewall ports can be set for explicit ports, so the firewall does not have to be turned off.

Important Note

REMEMBER: If you are migrating to a cloud service, make sure you check how ports are configured as even if you have the firewall off on the server, the cloud service still requires you to configure the firewall outside the server. This would then allow you to open the ports necessary for the farm to communicate locally and over the internet. Do this configuration at the beginning so that you have no issues with setting up services at the end!

SQL outbound port configuration

Setting the firewall ports is a step you want to make sure to check before installation. Without it, you will not be able to communicate with the SharePoint servers. SharePoint servers will not be able to connect, create, or manage databases. We want to make sure to check the configuration of the server and check to see whether the Windows Firewall is even needed. In some cases, you may not need to have the firewall running. You also want to be sure that the AWS firewall ports are set within the service before you even start your installation.

The outbound ports are listed as follows. Make sure to name your ports specifically so that you know what they are being used for. You can also change the names as needed. The following code can be run in a command window as an administrator:

```
netsh advfirewall firewall add rule name="SQL RPC Transact SQL
TCP Port 135" dir=out action=allow protocol=TCP localport=135
netsh advfirewall firewall add rule name="SQL Default TCP Port
1433" dir=out action=allow protocol=TCP localport=1433
netsh advfirewall firewall add rule name="SQL Named Instance
TCP Port 1434" dir=out action=allow protocol=TCP localport=1434
netsh advfirewall firewall add rule name="SQL Named Instance
UDP Port 1434" dir=out action=allow protocol=UDP localport=1434
netsh advfirewall firewall add rule name="SQL Broker UDP Port
4022" dir=out action=allow protocol=TCP localport=4022
netsh advfirewall firewall add rule name="SQL Analysis Services
TCP Port 2383" dir=out action=allow protocol=TCP localport=2383
netsh advfirewall firewall add rule name="SQL Browser TCP Port
2382" dir=out action=allow protocol=TCP localport=2382
netsh advfirewall firewall add rule name="SQL IPsec UDP Port
500" dir=out action=allow protocol=UDP localport=500
netsh advfirewall firewall add rule name="SQL IPsec DB
Mirroring TCP Port 4500" dir=out action=allow protocol=TCP
localport=4500
```

The SQL outbound ports are now set, so let's set our inbound ports.

SQL inbound port configuration

Inbound ports are just as important as outbound ports, so make sure you update these ports before you start your installation. Name your ports specifically so that you know what they are being used for and change the names as needed.

Inbound ports are listed as follows. The following code can be run in a command window as an administrator:

```
netsh advfirewall firewall add rule name="SQL Default TCP Port 1433" dir=in action=allow protocol=TCP localport=1433
```

```
netsh advfirewall firewall add rule name="SQL Named Instance TCP Port 1434" dir=in action=allow protocol=TCP localport=1434
```

```
netsh advfirewall firewall add rule name="SQL Named Instance UDP Port 1434" dir=in action=allow protocol=UDP localport=1434
```

```
netsh advfirewall firewall add rule name="SQL Broker UDP Port 4022" dir=in action=allow protocol=TCP localport=4022
```

```
netsh advfirewall firewall add rule name="SQL DB Mirroring TCP Port 5022" dir=in action=allow protocol=TCP localport=5022
```

```
netsh advfirewall firewall add rule name="SQL DB Mirroring TCP Port 7022" dir=in action=allow protocol=TCP localport=7022
```

```
netsh advfirewall firewall add rule name="SQL Analysis Services TCP Port 2383" dir=in action=allow protocol=TCP localport=2383
```

```
netsh advfirewall firewall add rule name="SQL Browser TCP Port 2382" dir=in action=allow protocol=TCP localport=2382
```

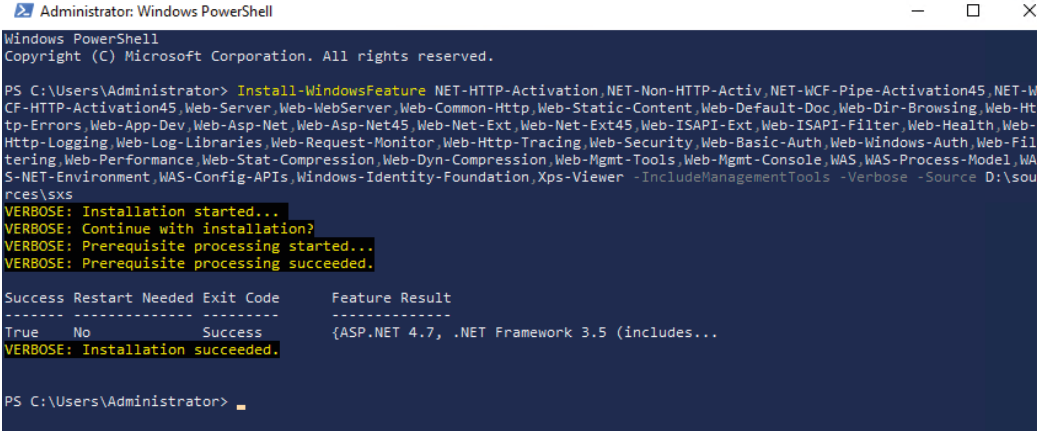
```
netsh advfirewall firewall add rule name="SQL IPsec UDP Port 500" dir=in action=allow protocol=UDP localport=500
```

```
netsh advfirewall firewall add rule name="SQL IPsec DB Mirroring TCP Port 4500" dir=in action=allow protocol=TCP localport=4500
```

Now that you have created your VM for SQL Server, we need to set our feature installation, which consists of features being configured on the Windows server to support SQL Server 2017. Open a PowerShell window and run the following command as an administrator:

```
Install-WindowsFeature NET-HTTP-Activation,NET-Non-HTTP-Activ,NET-WCF-Pipe-Activation45,NET-WCF-HTTP-Activation45,Web-Server,Web-WebServer,Web-Common-Http,Web-Static-Content,Web-Default-Doc,Web-Dir-Browsing,Web-Http-Errors,Web-App-Dev,Web-Asp-Net,Web-Asp-Net45,Web-Net-Ext,Web-Net-Ext45,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-Health,Web-Http-Logging,Web-Log-Libraries,Web-Request-Monitor,Web-Http-Tracing,Web-Security,Web-Basic-Auth,Web-Windows-Auth,Web-Filtering,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Mgmt-Tools,Web-Mgmt-Console,WAS,WAS-Process-Model,WAS-NET-Environment,WAS-Config-APIs,Windows-Identity-Foundation,Xps-Viewer -IncludeManagementTools -Verbose -Source (windows server installation location\sxs)
```

This command installs the features needed to support SQL Server:



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\Administrator> Install-WindowsFeature NET-HTTP-Activation,NET-Non-HTTP-Activ,NET-WCF-Pipe-Activation45,NET-WCF-HTTP-Activation45,Web-Server,Web-WebServer,Web-Common-Http,Web-Static-Content,Web-Default-Doc,Web-Dir-Browsing,Web-Http-Errors,Web-App-Dev,Web-Asp-Net,Web-Asp-Net45,Web-Net-Ext,Web-Net-Ext45,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-Health,Web-Http-Logging,Web-Log-Libraries,Web-Request-Monitor,Web-Http-Tracing,Web-Security,Web-Basic-Auth,Web-Windows-Auth,Web-Filtering,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Mgmt-Tools,Web-Mgmt-Console,WAS,WAS-Process-Model,WAS-NET-Environment,WAS-Config-APIs,Windows-Identity-Foundation,Xps-Viewer -IncludeManagementTools -Verbose -Source D:\sources\sxs
VERBOSE: Installation started...
VERBOSE: Continue with installation?
VERBOSE: Prerequisite processing started...
VERBOSE: Prerequisite processing succeeded.

Success Restart Needed Exit Code      Feature Result
-----
True      No          Success      {ASP.NET 4.7, .NET Framework 3.5 (includes...
VERBOSE: Installation succeeded.

PS C:\Users\Administrator>
```

Figure 4.2 – Prerequisite installation

In the past, we had to manually install features using a server manager, which could take up a lot of time depending on how many servers you had to prepare for installation.

To get started with the SQL installation, follow the steps given here:

1. Log in with your SQL admin account only; do not use your personal account to install SQL Server. Also, have the media available on a DVD or USB to get started. After you have started the installation, you will see a window open called **SQL Server Installation Center**, as shown in the following screenshot:

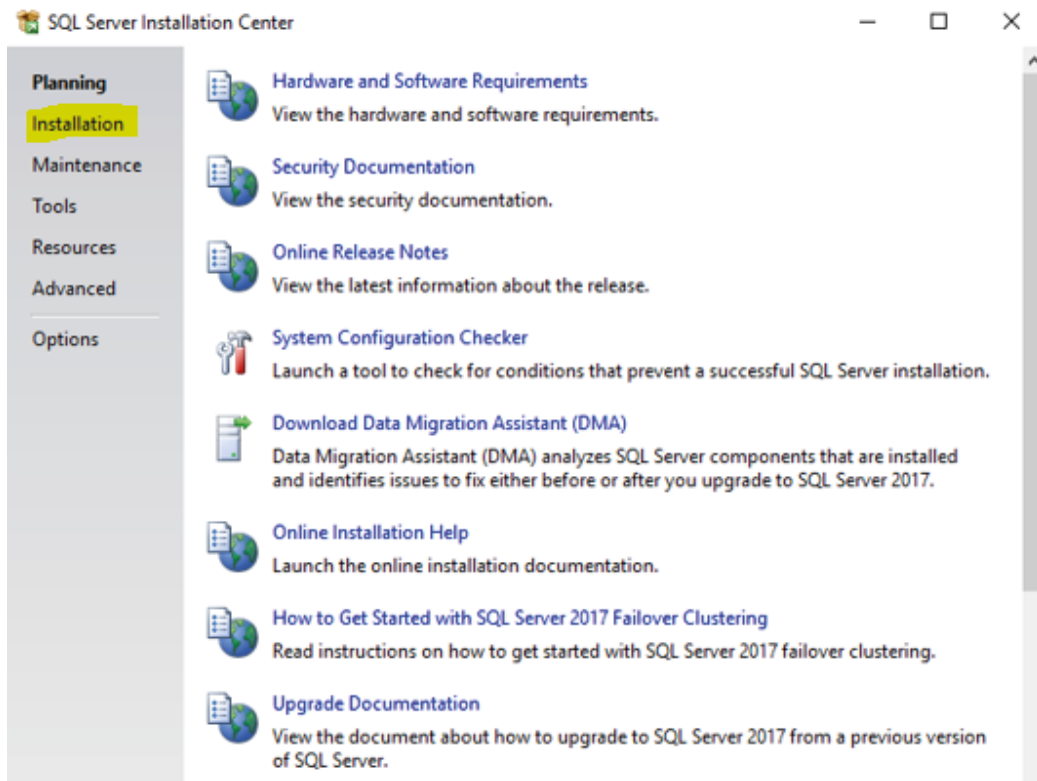


Figure 4.3 – SQL Server Installation Center

2. Click **Installation** on the left main navigation list and click the **New SQL Server stand-alone installation or add features to an existing installation** link in the main area of the screen at the top:

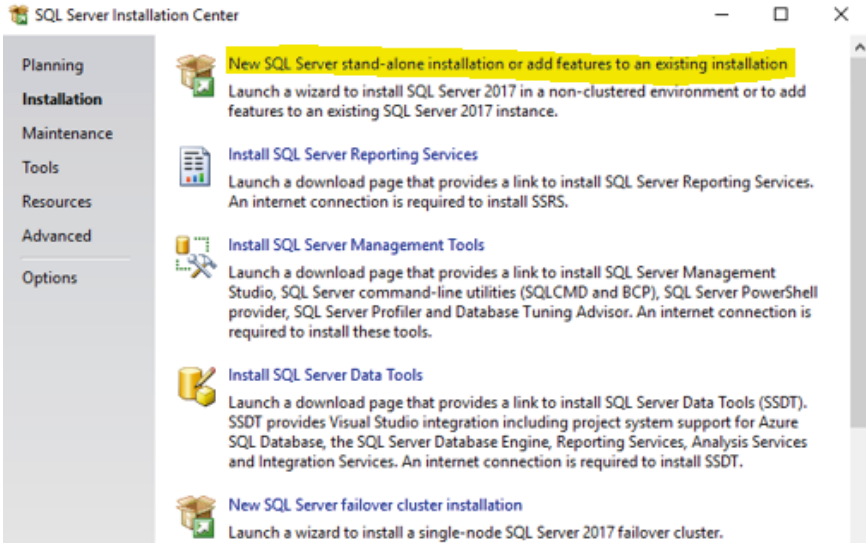


Figure 4.4 – Selecting a new SQL standalone installation

3. Add your product key to continue the installation:

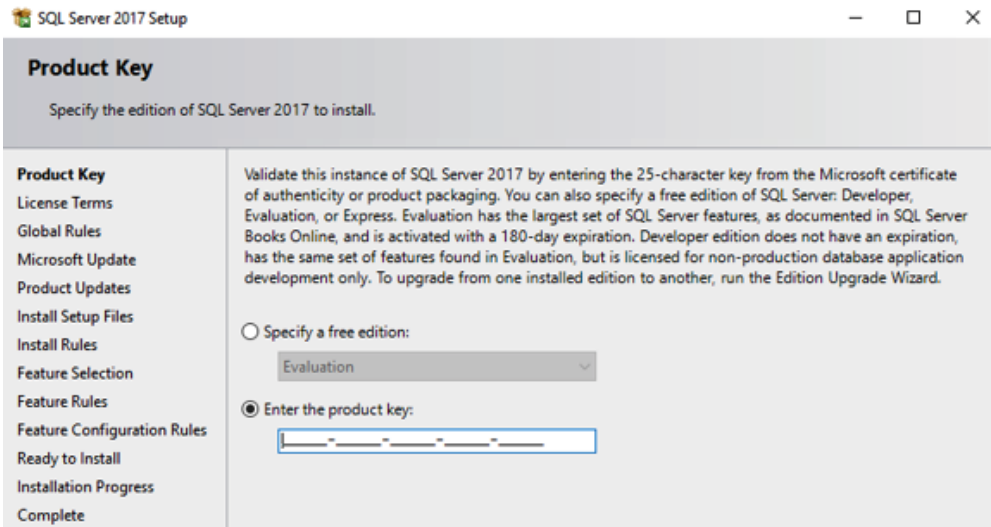


Figure 4.5 – Product key entry

4. Click the checkbox to accept the license terms:

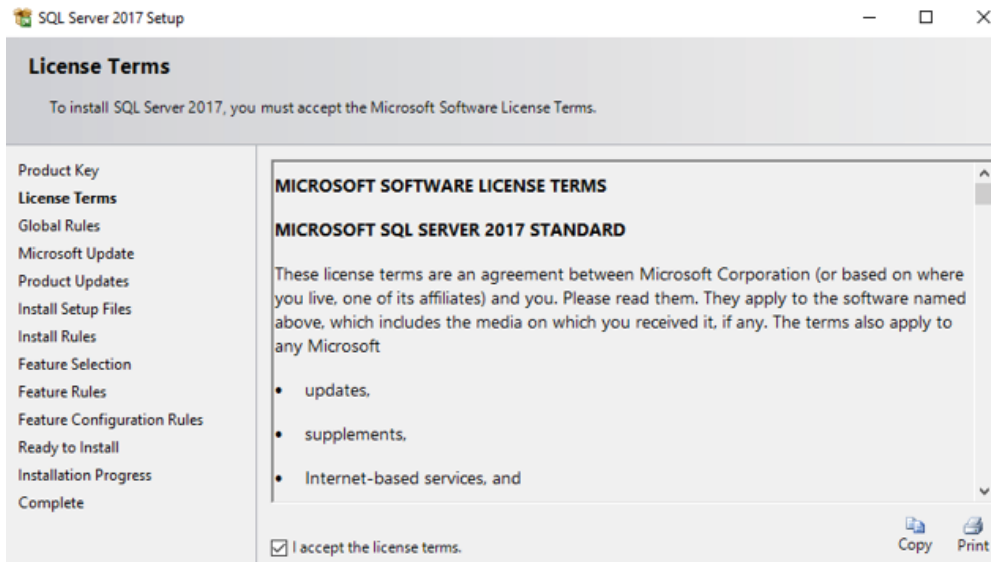


Figure 4.6 – License terms

5. If you would like automatic updates to be provided via Windows Update, select the recommended process, and then select the checkbox. If you plan to use another method such as manual updates, then do not check this box, and just make sure you always download the updates and apply them as needed. Click **Next** to continue with the installation:

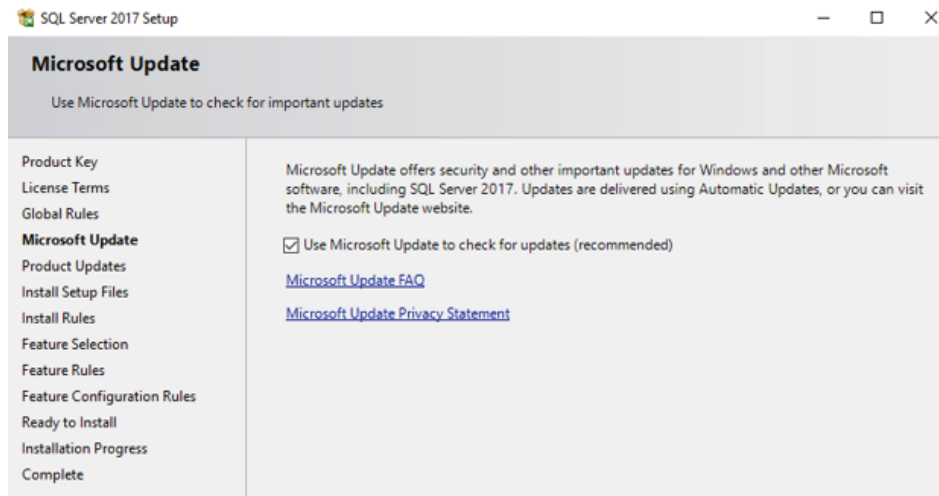


Figure 4.7 – Microsoft Update

6. The SQL Server installation finds any updates and installs them. Your server must be connected to the internet to use Windows Update. Click **Next** to continue the installation:

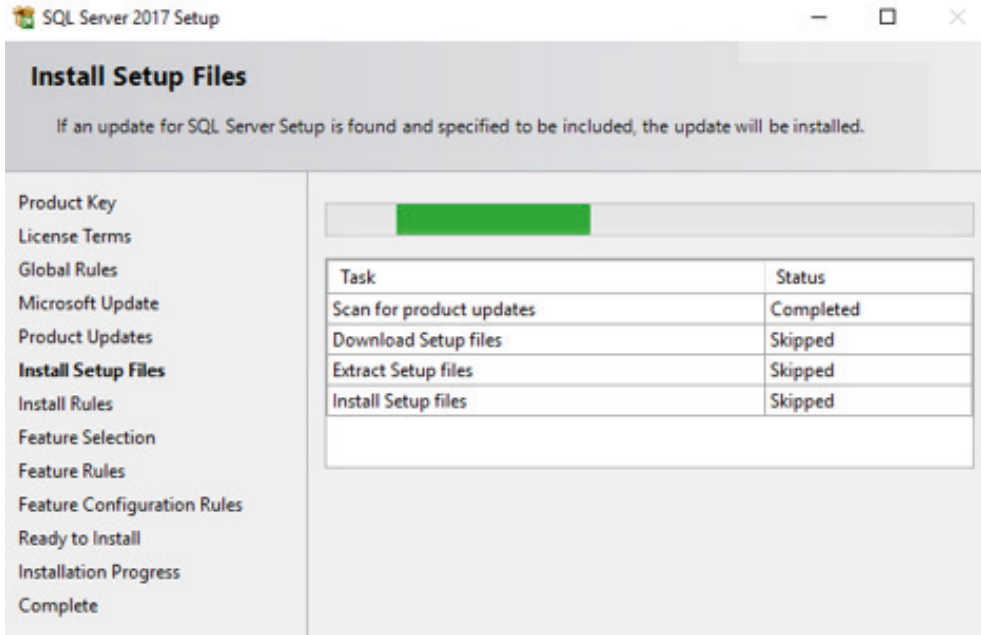


Figure 4.8 – Install Setup Files

7. **Feature Selection** provides the features you would like to install and use within the SQL configuration. Choose your features and select the location for the instance directory, feature directory, and x86 feature directory. More than likely, you will keep the same location on the C drive to support these features, but I have seen instances where there are three drives set up on servers that give an operating system, application, and data drive to support applications and growth:

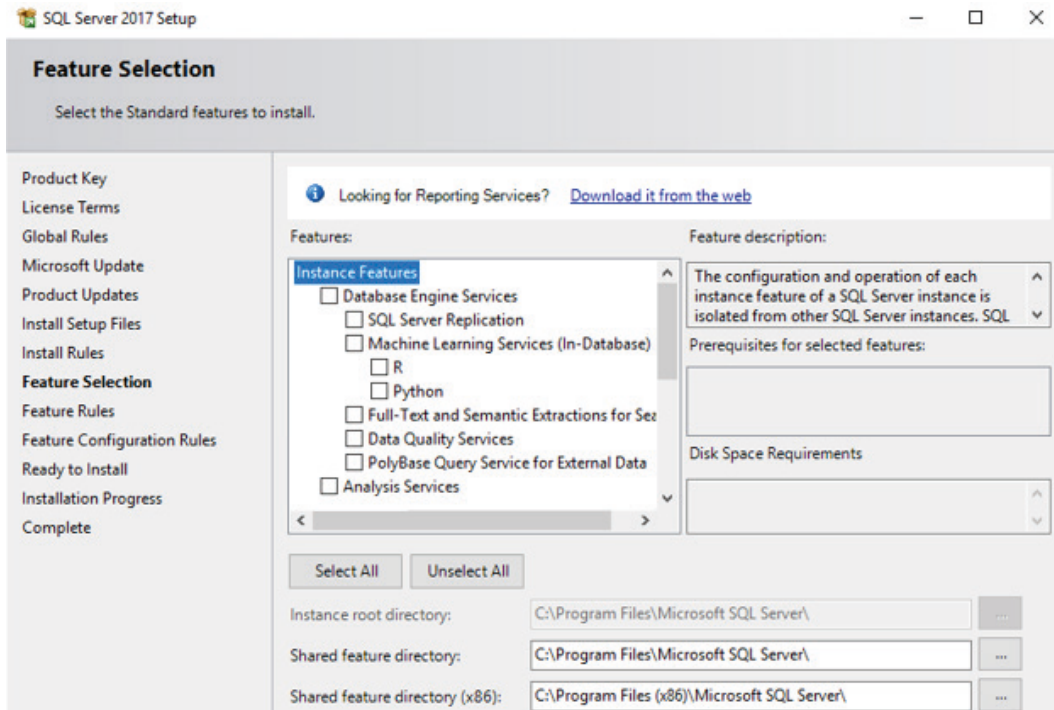


Figure 4.9 – Feature Selection

8. As you can see in the feature choices, we have to select the features we would like to use in our SQL Server 2017 configuration. I chose the following:
- **Database Engine Services**
 - **SQL Server Replication**
 - **Full-Text and Semantic Extractions for Search**
 - **Analysis Services**

9. Some features do not need to be chosen as they do not pertain to SharePoint-supported features. Click **Next** to continue the installation:

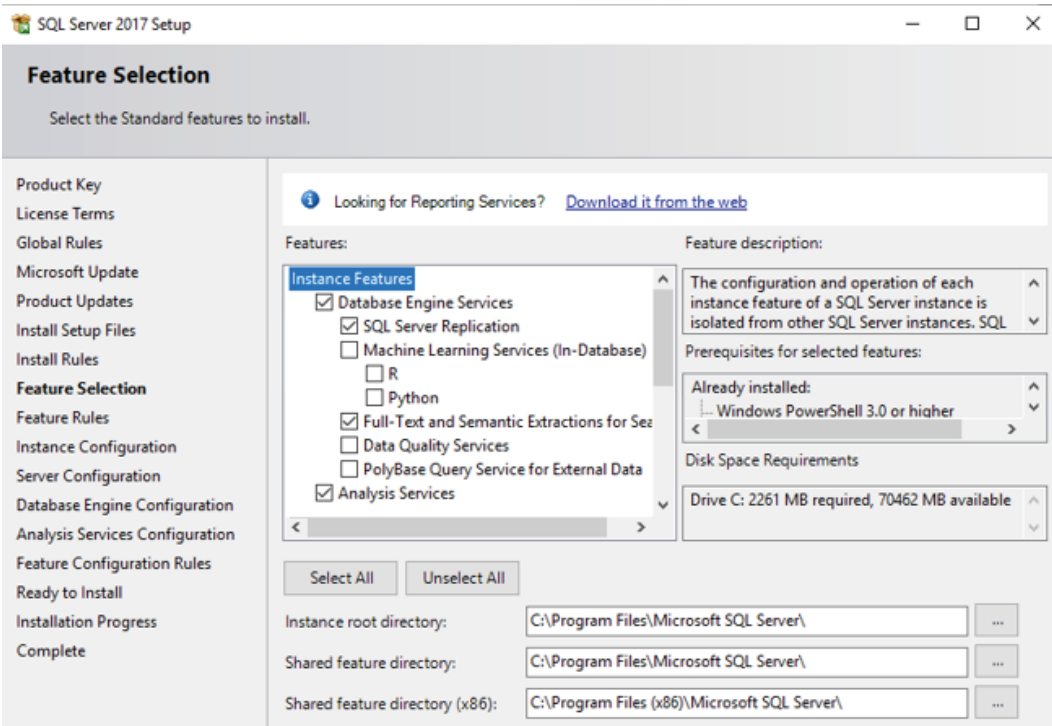


Figure 4.10 – Note the features selected

10. The next step is **Instance Configuration**. Click **Next** to install the default instance of SQL Server:

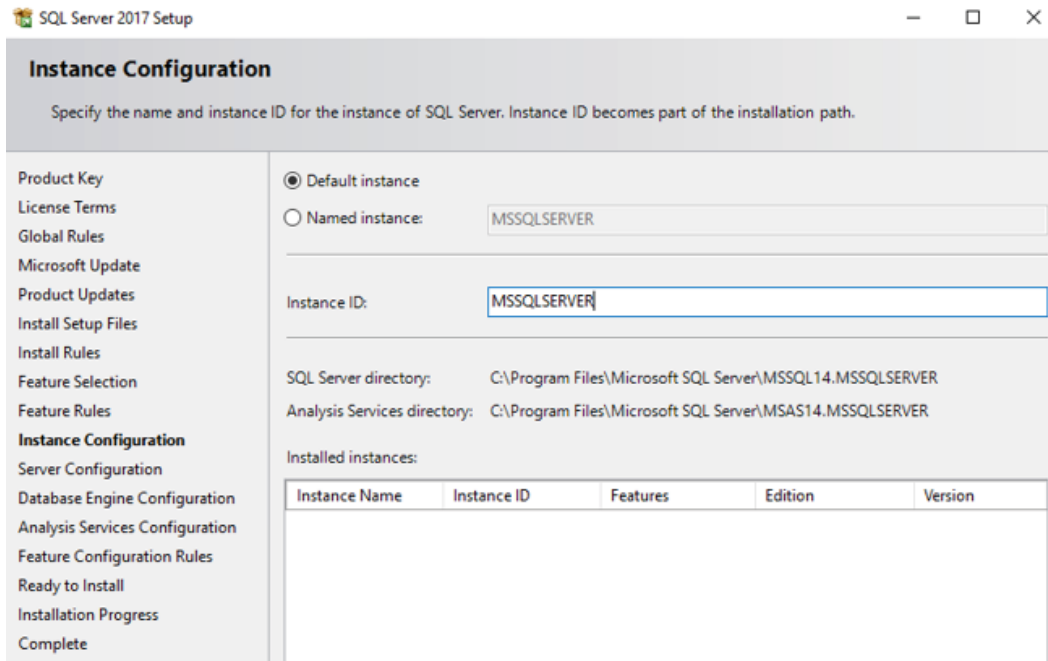


Figure 4.11 – Instance Configuration

11. Since this is our first instance on the server, we will install the default instance. If you want, you can rename it using the instance ID. You can use **Named instance** for the next instances of SQL Server on the same server as a separate service. I have done that in the past when I have had third-party applications that needed a place to live. Since they are associated with SharePoint, I configured a named instance to house those third-party databases. This works great only if you have the resources to support all the components. I would not suggest doing this on a VM but only on a server that is not running virtualization.

12. Service account configuration has not changed. Please add your service accounts to select the service you would like them to run. In my case, I have my SQL admin account, which I am logged into while running the setup and installation. The accounts I need for this configuration are to be used as service accounts. I have an account named **SQL User** mentioned in this chapter. You can name this account what you want but in my case, I named the account `SQL Service`. I will use it to configure the services. In some cases, admins have separate services using separate accounts. Click the **Collation** tab to continue the installation:

Service Accounts Collation

Microsoft recommends that you use a separate account for each SQL Server service.

Service	Account Name	Password	Startup Type
SQL Server Agent	NT Service\SQLSERVERA...		Manual
SQL Server Database Engine	NT Service\MSSQLSERVER		Automatic
SQL Server Analysis Services	NT Service\MSSQLServer...		Automatic
SQL Server Integration Services 14.0	NT Service\MsDtsServer...		Automatic
SQL Full-text Filter Daemon Launc...	NT Service\MSSQLFDLa...		Manual
SQL Server Browser	NT AUTHORITY\LOCAL ...		Disabled

☒ Grant Perform Volume Maintenance Task privilege to SQL Server Database Engine Service

This privilege enables instant file initialization by avoiding zeroing of data pages. This may lead to information disclosure by allowing deleted content to be accessed.

[Click here for details](#)

Figure 4.12 – The Service Accounts and Collation tabs

Important Note

As you select the account, make sure to click and choose them from the people picker; if not, you will receive an error that the account cannot be found.

13. The collation at this point on the server must be configured to be case-insensitive. There have been many blogs talking about this and from a Microsoft standpoint, this does not need to be set to any specific collation as long as it's case-insensitive. The collations of the created databases must be set correctly with the SharePoint default collation, which is `Latin1_General_CI_AS_KS_WS`. Click **Next** to continue the installation.

14. Setting authentication for administrators should be completed using the current account you are logged in with as a given and adding any other accounts that will be deemed administrators of the SQL instance. We do not want to select **Mixed Mode** for our SQL server. As a best practice, we should only be using **Windows Authentication Mode** to support SharePoint environments. If you plan to use **Mixed Mode**, in most cases, it means you plan to house other databases on the server as well. This goes against Microsoft's best practices as all SQL servers deemed that the data tier for SharePoint should only support that SharePoint farm. Click **Next** to continue the installation.
15. This screen has not changed much with the SQL Server installation process and it still wants you to share the location in which it should hold the files for the configuration. Update the locations as needed in this window.

In theory, we should have several locations for this and should not have all files created on the same drive. As part of my installation process, I used separate disks to hold the locations of my database files, which are separated by configuration type. So, in theory, this configuration out of the box does not work for me, which is why I pre-create my databases.

The reason for pre-creating my databases is because I use separate drive spaces to house my config databases, content databases, service databases, search databases, TempDB databases, and any other databases that are part of my installation outside of SharePoint, like how Workflow Manager would be a house on its own drive space. The reason I do this type of setup is I want to get the best performance out of my databases and have them use their own space. So, on this screen, I would set up my targeted locations for these areas but the split will also happen later when more databases are created.

16. Click **TempDB** to see the setting available for configuration and continue the installation:

Server Configuration | Data Directories | **TempDB** | FILESTREAM

TempDB data files: tempdb.mdf

Number of files: 1

Initial size (MB): 8 Total initial size (MB): 8

Autogrowth (MB): 64 Total autogrowth (MB): 64

Data directories: C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER

TempDB log file: templog.ldf

Initial size (MB): 8 Setup could take longer with large initial size.

Autogrowth (MB): 64

Log directory: C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER

Figure 4.13 – TempDB options

17. Configuring **TempDB**, we will see a different screen than other SQL Server installations in the past. Although this is the same as for SQL Server 2016, I want to make sure that since these two products have been so closely released, you understand this new database engine configuration page. You may be migrating from SQL 2008 or 2012 at this point, so I do not want to miss out anything in the book. Click the **FILESTREAM** tab to continue the installation:

Server Configuration | Data Directories | TempDB | **FILESTREAM**

☒ Enable FILESTREAM for Transact-SQL access

☒ Enable FILESTREAM for file I/O access

Windows share name: MSSQLSERVER

☒ Allow remote clients access to FILESTREAM data

Figure 4.14 – FILESTREAM options

18. FILESTREAM is used for **Remote Blob Storage**, also known as **RBS**. If you are planning to configure that service, you need to click the checkboxes associated with this feature so that it can be installed. Click **Next** to continue the installation:

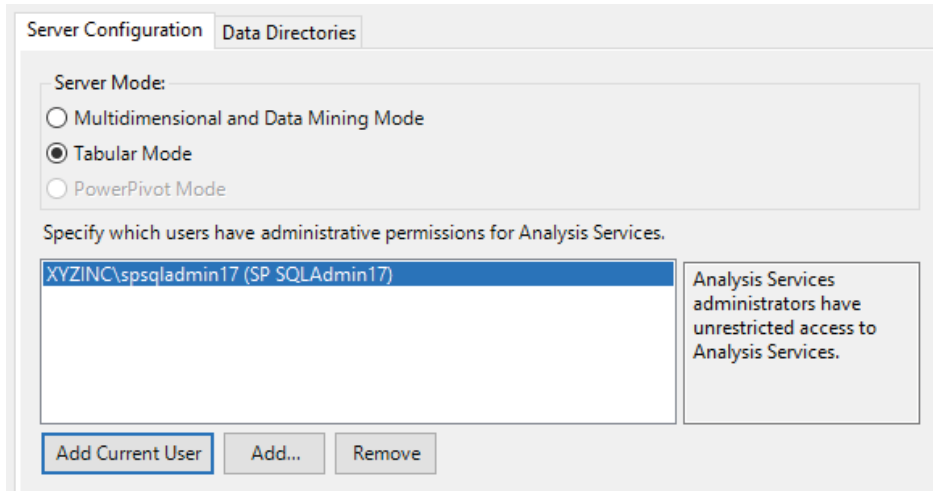


Figure 4.15 – Server configuration

19. Setting administrator rights within Analysis Services should be completed. Please add the admin account you are logged in with as you are performing the installation and any other accounts you will need to have admin access to this feature for administration. Click **Next** to continue the installation:

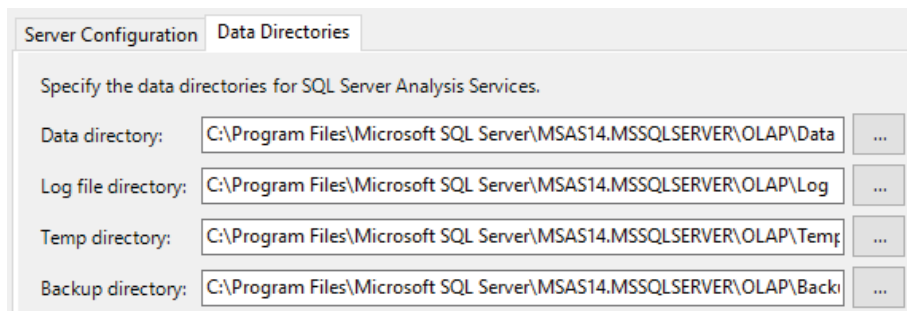


Figure 4.16 – Data Directories

20. Configuring data directories goes back to what I was saying about pre-creating databases as well, which is the way I install and configure my databases. This area is also configured as drive space within my configuration to hold these databases. Choose your locations and click **Next** to continue the installation.

21. Now that all the configurations have been set, we will click on **Install** and start the installation process for the SQL server.
22. The installation is progressing and this does progress slowly, so just be patient and you will start seeing results.
23. Installation is complete. Please click **Close** to finish the install and afterward, reboot your server. Your server is now ready for further configuration, which we will tackle in *Chapter 5, Farm and Services Configuration*.

We are not finished installing our SQL database server. If you need to add any other custom utilities or updates to your database server, please do so now. Once we get our SharePoint farm configured, we will set up our maintenance plans to back up our content and services.

Configuring SharePoint 2019 prerequisites

When we start the installation of SharePoint, we need to make sure the following things are available:

- Installation software (DVD, ISO, USB).
- Keys for licensing.
- Accounts created for the service and admin identities.
- AD: SharePoint Server 2019 is only supported with a minimum of AD 2003.
- Admin rights are given to the admin account running the installation.
- Download the prerequisites needed to do the installation.
- Identical hard drive configurations on all SharePoint servers (always at least two drives configured).
- Turn off Windows Firewall unless you have to download my script to configure the ports manually.

Note that the Office 2019 client cannot be installed on the same server as SharePoint Server 2019.

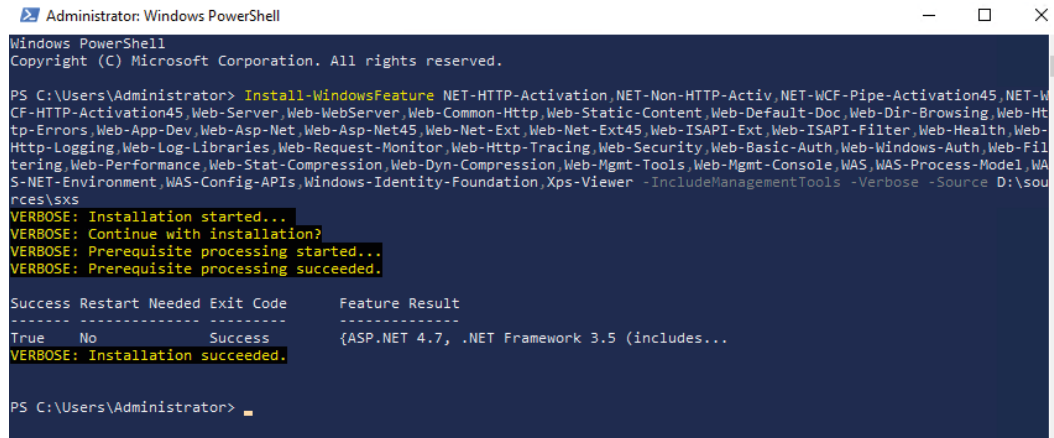
Preparing the server is the same as we did for SQL Server 2017 in the *Configuring SQL Server 2017* section of this chapter. Repeat these steps on all SQL and SharePoint servers:

```
Install-WindowsFeature NET-HTTP-Activation,NET-Non-HTTP-
Activ,NET-WCF-Pipe-Activation45,NET-WCF-HTTP-Activation45,Web-
Server,Web-WebServer,Web-Common-Http,Web-Static-Content,Web-
Default-Doc,Web-Dir-Browsing,Web-Http-Errors,Web-App-
Dev,Web-Asp-Net,Web-Asp-Net45,Web-Net-Ext,Web-Net-Ext45,Web-
ISAPI-Ext,Web-ISAPI-Filter,Web-Health,Web-Http-Logging,Web-
Log-Libraries,Web-Request-Monitor,Web-Http-Tracing,Web-
Security,Web-Basic-Auth,Web-Windows-Auth,Web-Filtering,Web-
Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-
Mgmt-Tools,Web-Mgmt-Console,WAS,WAS-Process-Model,WAS-NET-
Environment,WAS-Config-APIs,Windows-Identity-Foundation,Xps-
Viewer -IncludeManagementTools -Verbose -Source (windows server
installation location\sxs)
```

Important Note

Make sure to include the Windows Server media SXS location in the
-Source parameter of the script.

Once you have run the feature installation script on the SharePoint server, you will see the confirmation that the installation succeeded, like so:



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\Administrator> Install-WindowsFeature NET-HTTP-Activation,NET-Non-HTTP-Activ,NET-WCF-Pipe-Activation45,NET-W
CF-HTTP-Activation45,Web-Server,Web-WebServer,Web-Common-Http,Web-Static-Content,Web-Default-Doc,Web-Dir-Browsing,Web-Ht
tp-Errors,Web-App-Dev,Web-Asp-Net,Web-Asp-Net45,Web-Net-Ext,Web-Net-Ext45,Web-ISAPI-Ext,Web-ISAPI-Filter,Web-Health,Web-
Http-Logging,Web-Log-Libraries,Web-Request-Monitor,Web-Http-Tracing,Web-Security,Web-Basic-Auth,Web-Windows-Auth,Web-Fil
tering,Web-Performance,Web-Stat-Compression,Web-Dyn-Compression,Web-Mgmt-Tools,Web-Mgmt-Console,WAS,WAS-Process-Model,W
S-NET-Environment,WAS-Config-APIs,Windows-Identity-Foundation,Xps-Viewer -IncludeManagementTools -Verbose -Source D:\sou
rces\sxs
VERBOSE: Installation started...
VERBOSE: Continue with installation?
VERBOSE: Prerequisite processing started...
VERBOSE: Prerequisite processing succeeded.

Success Restart Needed Exit Code      Feature Result
-----
True      No          Success      {ASP.NET 4.7, .NET Framework 3.5 (includes...

VERBOSE: Installation succeeded.

PS C:\Users\Administrator>
```

Figure 4.17 – Installation success confirmation

The local policy settings for SharePoint service accounts are as follows:

Name	Description	Local User Rights	Domain Rights	SQL Permission
SPAdmin	Used for installation and to perform product configuration	Local administrator on SharePoint Server, adjust memory quotas for a process, impersonate a client after authentication, log on as a batch job, log on as a service, restore files and directories, and take ownership of files or other objects	Domain user	The public, dbcreator, and security admin SQL roles
SPFarm	It is used for the following tasks: to configure and manage the server farm and to run Microsoft SP Foundation Workflow Timer Service, Central Administration, and the User Profile service	Local administrator on SharePoint Server during UPS provisioning, local administrator (remove after complete configuration), back up files and directories, bypass traverse checking, impersonate a client after authentication, log on as a batch job, log on as a service, replace a process level, and generate security audits	Domain user	The public, dbcreator, and security admin SQL roles
SPWebApps	Used to run web application pools	Adjust memory quotas for a process, impersonate a client after authentication, log on as a batch job, Log on as a service	Domain user	None
SPService Apps	Used to run service application pools	Adjust memory quotas for a process, impersonate a client after authentication, log on as a batch job, and log on as a service	Domain user	None

Name	Description	Local User Rights	Domain Rights	SQL Permission
SPSearch	Used as the default account by the Search Service application to crawl content.	Impersonate a client after authentication, log on as a batch job, and log on as a service	Domain user	None
SPPProfile	User for user profile synchronization account.	None	Domain user and Replicated Directory Changes permission on the domain	None

Figure 4.18 – Local policy table

Make sure to create the service accounts you need for your installation. The web application and service application pools can be used many times depending on what you need in your environment. For example, for an additional web application pool, I would add one for `mysites` to cover that web application separately from my main application pool. All installations of SharePoint, depending on the admin account, require different numbers of service accounts based on what you want to configure in your farm. There are a couple of accounts missing that we will talk about later in the book as those services are created:

- Cache accounts
- Workflow Manager accounts
- Office Online Server accounts
- SharePoint crawl account (only needed if you want to separate at that level for security)
- Business Connectivity service (accounts may be needed to connect to outside data sources)

The local policy is very important as the rights given to each service account are reflected in the local policy settings. If the service account is not given the proper rights, you will see errors in your event logs pertaining to that particular service, which can be misleading. This is due to the errors given not telling you specifically what the issue is in some cases.

Domain policies come into play as well as they can overwrite these local policies set by SharePoint automatically. This usually happens only when the server is rebooted, so you could think you have a great configuration until you reboot one day and then the service is down. Be very careful how you use local and domain policies within a SharePoint and SQL Server configuration. Talk to your AD group to make sure these areas within the domain and local server policies have been covered.

SharePoint outbound port configuration

Port settings for the SharePoint servers are required for communication between the farm servers and the SQL server. It is important that you do not skip this step as this can cause the farm to be non-operational.

As part of our configuration, the firewall is very important to configure as the ports for the server need to be open to support the SharePoint Server configuration. This script configures the firewall port outbound settings for SharePoint servers individually. The following code can be run in a command-line window as an administrator:

```
netsh advfirewall firewall add rule name="SharePoint Open Port
80" dir=out action=allow protocol=TCP localport=80
netsh advfirewall firewall add rule name="SharePoint Open Port
443" dir=out action=allow protocol=TCP localport=443
netsh advfirewall firewall add rule name="SharePoint SQL Open
Ports" dir=out action=allow protocol=TCP localport=1433-1434
netsh advfirewall firewall add rule name="SharePoint SQL Open
Port 445" dir=out action=allow protocol=TCP localport=445
netsh advfirewall firewall add rule name="SharePoint Open Port
25" dir=out action=allow protocol=TCP localport=25
netsh advfirewall firewall add rule name="SharePoint
Open Port 16500-16519" dir=out action=allow protocol=TCP
localport=16500-16519
netsh advfirewall firewall add rule name="SharePoint Open Port
22233" dir=out action=allow protocol=TCP localport=22233-22236
netsh advfirewall firewall add rule name="SharePoint Open Port
443" dir=out action=allow protocol=TCP localport=443
netsh advfirewall firewall add rule name="SharePoint Open Port
808" dir=out action=allow protocol=TCP localport=808
netsh advfirewall firewall add rule name="SharePoint Open Port
32843" dir=out action=allow protocol=TCP localport=32843-32846
netsh advfirewall firewall add rule name="SharePoint
Workflow Manager Open Port 12290-12291" dir=out action=allow
```

```
protocol=TCP localport=12290-12291
netsh advfirewall firewall add rule name="SharePoint Open Port
5725" dir=out action=allow protocol=TCP localport=5725
netsh advfirewall firewall add rule name="SharePoint Open Port
389" dir=out action=allow protocol=TCP localport=389
netsh advfirewall firewall add rule name="SharePoint Open Port
389" dir=out action=allow protocol=UDP localport=389
netsh advfirewall firewall add rule name="SharePoint Open Port
88" dir=out action=allow protocol=TCP localport=88
netsh advfirewall firewall add rule name="SharePoint Open Port
88" dir=out action=allow protocol=UDP localport=88
netsh advfirewall firewall add rule name="SharePoint Open Port
53" dir=out action=allow protocol=TCP localport=53
netsh advfirewall firewall add rule name="SharePoint Open Port
53" dir=out action=allow protocol=UDP localport=53
netsh advfirewall firewall add rule name="SharePoint Open Port
464" dir=out action=allow protocol=UDP localport=464
netsh advfirewall firewall add rule name="SharePoint Open Port
809" dir=out action=allow protocol=TCP localport=809
```

Once we have completed the outbound ports, let's configure the inbound ports on your SharePoint server next.

SharePoint Server inbound port configuration

Inbound ports are just as important as outbound ports. Communication between the farm server resources is needed to support the infrastructure. This script configures firewall port inbound settings for SharePoint Server. The following code can be run in a command window as an administrator:

```
netsh advfirewall firewall add rule name="SharePoint Open Port
80" dir=in action=allow protocol=TCP localport=80
netsh advfirewall firewall add rule name="SharePoint Open Port
443" dir=in action=allow protocol=TCP localport=443
netsh advfirewall firewall add rule name="SharePoint Open Port
445" dir=in action=allow protocol=TCP localport=445
netsh advfirewall firewall add rule name="SharePoint Open Port
25" dir=in action=allow protocol=TCP localport=25
netsh advfirewall firewall add rule name="SharePoint Open
Port 16500 - 16519" dir=in action=allow protocol=TCP
localport=16500-16519
```

```
netsh advfirewall firewall add rule name="SharePoint Open Port
22233" dir=in action=allow protocol=TCP localport=22233-22236
netsh advfirewall firewall add rule name="SharePoint Open Port
808" dir=in action=allow protocol=TCP localport=808
netsh advfirewall firewall add rule name="SharePoint Open Port
32843" dir=in action=allow protocol=TCP localport=32843-32846
netsh advfirewall firewall add rule name="SharePoint Workflow
Manager Open Port 12290-12291" dir=in action=allow protocol=TCP
localport=12290-12291
netsh advfirewall firewall add rule name="SharePoint Open Port
5725" dir=in action=allow protocol=TCP localport=5725
netsh advfirewall firewall add rule name="SharePoint Open Port
389" dir=in action=allow protocol=TCP localport=389
netsh advfirewall firewall add rule name="SharePoint Open Port
389" dir=in action=allow protocol=UDP localport=389
netsh advfirewall firewall add rule name="SharePoint Open Port
88" dir=in action=allow protocol=TCP localport=88
netsh advfirewall firewall add rule name="SharePoint Open Port
88" dir=in action=allow protocol=UDP localport=88
netsh advfirewall firewall add rule name="SharePoint Open Port
53" dir=in action=allow protocol=TCP localport=53
netsh advfirewall firewall add rule name="SharePoint Open Port
53" dir=in action=allow protocol=UDP localport=53
netsh advfirewall firewall add rule name="SharePoint Open Port
464" dir=in action=allow protocol=UDP localport=464
netsh advfirewall firewall add rule name="SharePoint Open Port
809" dir=in action=allow protocol=TCP localport=809
```

Now that we have completed our outbound and inbound port configuration, let's learn about the preparation toolkit.

Disabling loopback check

By installing SharePoint, you will see that there are many little hidden issues we need to overcome before installing the application, such as ports, for example. When you install SharePoint, you will find that if you leave out this configuration for disabling loopback check, you will not be able to access your SharePoint sites from your servers. You can do this manually by going to the registry and editing the HKLM: \System\CurrentControlSet\Control\Lsa location and adding a new DWORD value of DisableLookbackCheck with a value of 1.

You can also simply use PowerShell:

```
New-ItemProperty HKLM:\System\CurrentControlSet\Control\Lsa  
-Name "DisableLoopbackCheck" -Value "1" -PropertyType DWORD
```

Microsoft SharePoint preparation toolkit

The Microsoft SharePoint Products Preparation Tool installs the following prerequisites on SharePoint servers in a farm after server features are installed:

- Web server (IIS) role
- The Windows Process Activation Service feature
- Microsoft .NET Framework version 3.5
- Microsoft .NET Framework version 4.7.2
- Microsoft SQL Server 2012 Service Pack 4 Native Client
- Microsoft WCF Data Services 5.6
- Microsoft Identity Extensions
- **Microsoft Information Protection and Control Client (MSIPC) 2.1**
- Microsoft Sync Framework Runtime v1.0 SP1 (x64)
- Windows Server AppFabric 1.1
- Cumulative Update package 7 for Microsoft AppFabric 1.1 for Windows Server (KB 3092423)
- Visual C++ Redistributable package for Visual Studio 2012
- Visual C++ Redistributable package for Visual Studio 2017

The following are optional software installations that support SharePoint 2019. These are in support of business intelligence service capabilities and may be required to support these services:

- .NET Framework Data Provider for SQL Server (part of Microsoft .NET Framework).
- .NET Framework Data Provider for OLE DB (part of Microsoft .NET Framework).
- SharePoint Workflow Manager: You can install SharePoint Workflow Manager on a dedicated computer.

- Microsoft SQL Server 2008 R2 Reporting Services Add-in for Microsoft SharePoint Technologies: This add-on is used by Access Services for SharePoint Server 2019.
- Microsoft SQL Server 2012 **Data-Tier Application (DAC)** Framework 64-bit edition
- Microsoft SQL Server 2012 Transact-SQL ScriptDom 64-bit edition
- Microsoft System CLR Types for Microsoft SQL Server 2012 64-bit edition
- Microsoft SQL Server 2012 with SP1 LocalDB 64-bit edition
- Microsoft Data Services for .NET Framework 4 and Silverlight 4 (formerly ADO.NET Data Services)
- Exchange Web Services Managed API, version 1.2

There are two ways to install prerequisites:

- Online if your server is connected to the internet
- Offline, where you would need to go and download all the prerequisites beforehand and use PowerShell to install the needed components.

In our case, I will explain both and provide details on how to install them. There is one new way to install via PowerShell as well, which I will also point out as an option.

When installing from our SharePoint DVD, ISO, or USB installation, we will see that Microsoft has included a new choice to install SharePoint Server 2019. Now, instead of needing to access the prerequisite installation from the file manager, we can do this from the splash menu. Add the prerequisites to the folder within the installation, which means you need to copy the installation to the server you are installing from so that these files can be associated with the install.

Important Note

Before we start the installation preparation using the tools provided by SharePoint Server 2019, we need to make sure we copy our installation to a hard drive location on the server. We need to do this to provide any updates, as in cumulative updates you may want to include during the installation and all the prerequisite files needed to finish the preparation for the server installation.

Once you have added all the updates and prerequisite files to a local installation folder, follow the steps given here:

1. Click on the **Install software prerequisites** link on the splash page to get started:

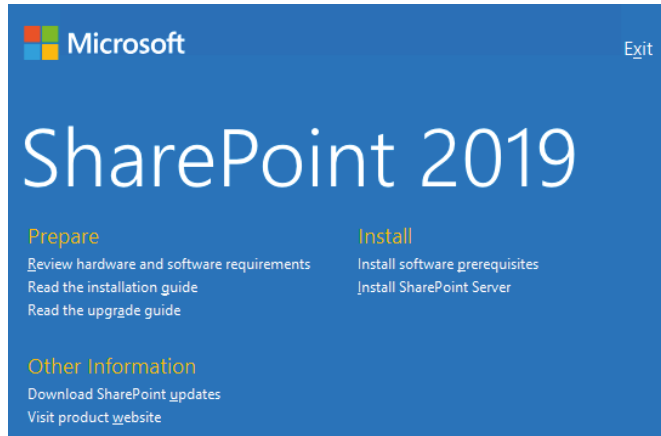


Figure 4.19 – SharePoint 2019 splash screen

2. Click **Next** to continue the installation of the Products Preparation Tool:

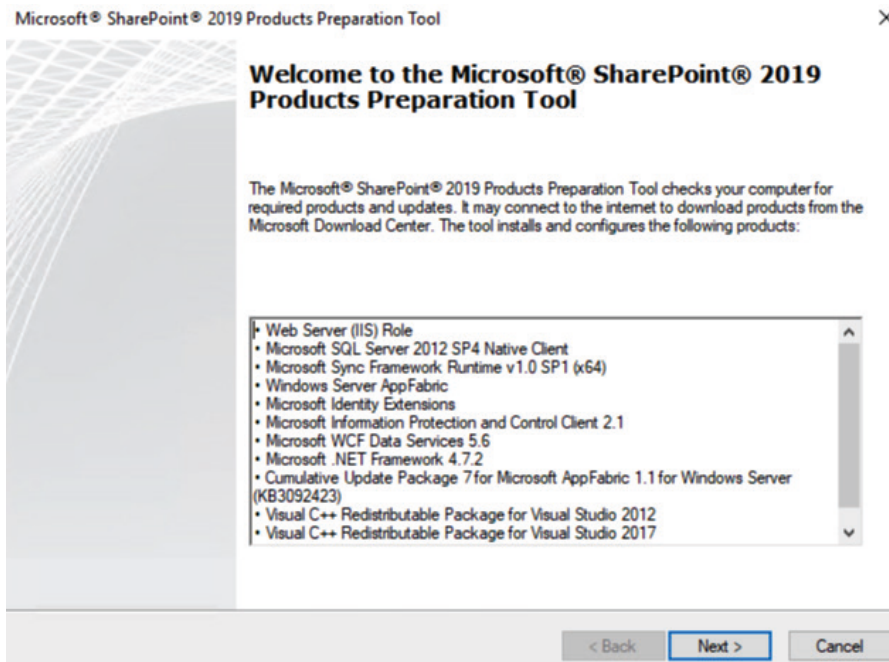


Figure 4.20 – Products Preparation Tool

3. Check the box to accept the license agreement and click **Next**:

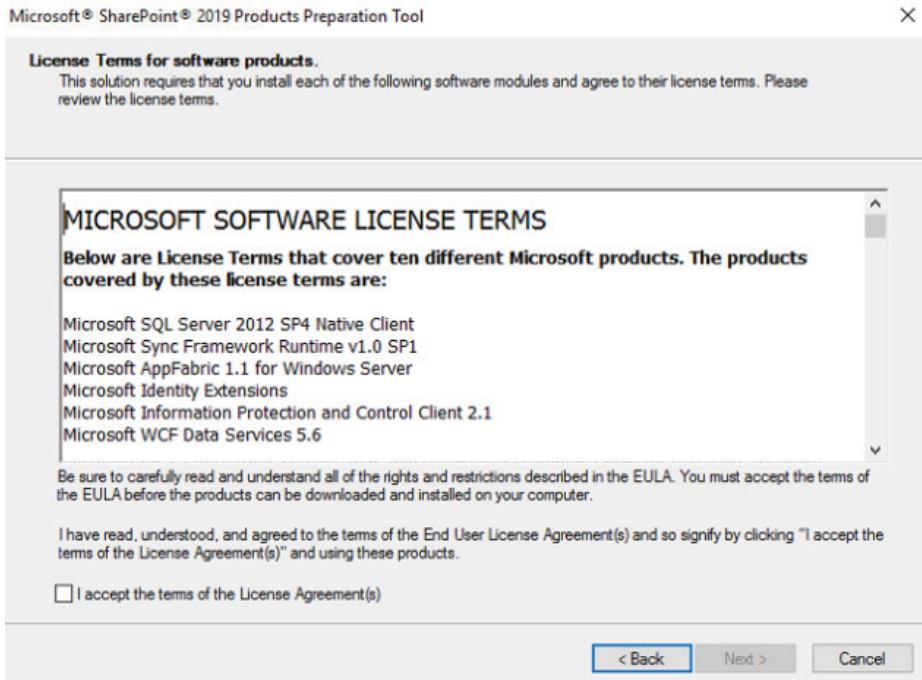


Figure 4.21 – License agreement

4. Monitor the process of the preparation tool until complete:

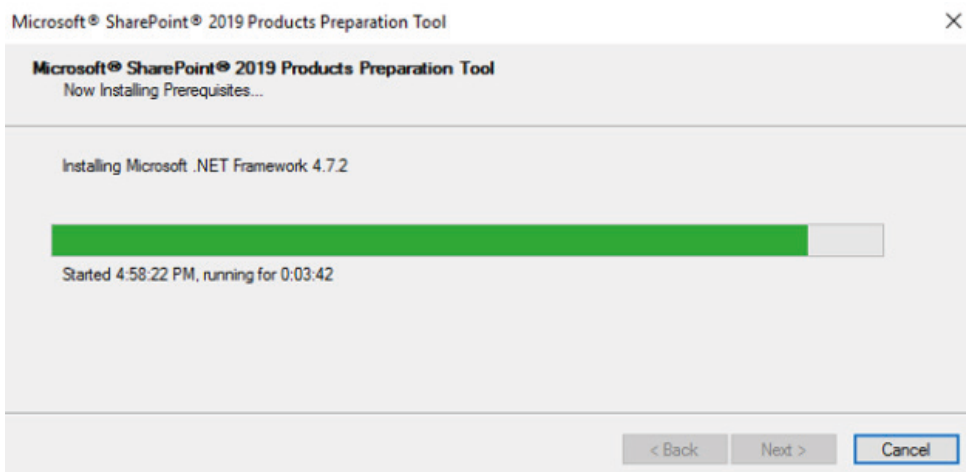


Figure 4.22 – Installing prerequisites

5. The server will reboot automatically during the installation and will continue after the server comes back up. You will be prompted with the following screen of the completed installation; just click **Finish**:

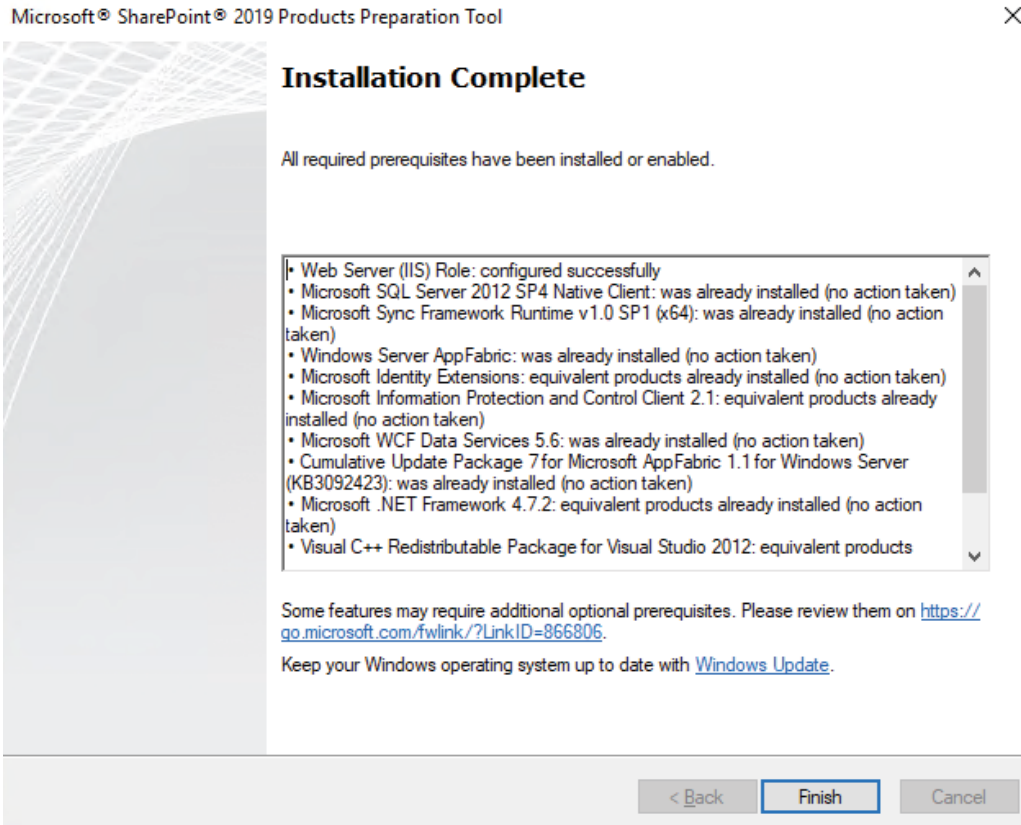


Figure 4.23 – Installation complete

This completes the GUI installation of the prerequisite files using the prerequisite installer from our installation files.

Scripted preparation tool installation

Installing using PowerShell is a different way of doing our installation. This method is used when we want to install the prerequisites offline.

Please run the following script to install the prerequisites using Command Prompt:

```
.\prerequisiteinstaller.exe
/SQLNcli:c:\(Folder)\sqlncli.msi
/Sync:c:\(Folder)\Synchronization.msi
/AppFabric:c:\(Folder)\WindowsServerAppFabricSetup_x64.exe
/IDFX11:c:\(Folder)\MicrosoftIdentityExtensions-64.msi
/MSIPCCClient:c:\(Folder)\setup_msipc_x64.exe
/WCFDataServices56:c:\(Folder)\WcfDataServices56.exe
/MSVCRT11:c:\(Folder)\vcredist_x64.exe
/MSVCRT141:c:\(Folder)\vc_redist.x64.exe
/KB3092423:c:\(Folder)\AppFabric-KB3092423-x64-ENU.exe
/DotNet472:c:\(Folder)\NDP472-KB4054530-x86-x64-AllOS-ENU.exe
/MSVCRT11:<file> Install Visual C++ Redistributable Package
for Visual Studio 2012 from <file>.
/MSVCRT141:<file> Install Visual C++ Redistributable Package
for Visual Studio 2017 from <file>.
```

There is also a new **desired state configuration**, which can be scripted to dynamically specify parameters for the prerequisites instead of the install doing it on its own from the internet. You can read more about that here: <https://docs.microsoft.com/en-us/powershell/scripting/dsc/overview/overview?view=powershell-7.1>.

Whether you use scripting or the GUI to install your prerequisites, it is up to you. It is good to practice scripting and PowerShell and as these scripts are elementary, they can help you start your journey to understand scripting and how it works. There is no real benefit in using either one, but best believe PowerShell is something you will need to understand. So, if you are new to it, start working with PowerShell now.

SharePoint 2019 installation

Now that we have finished our preparation for SharePoint Server 2019 installation, we can start our SharePoint Server 2019 install process. There are other tools that you can use to install SharePoint using an automated process. In this book, we will install using the manual method to get an understanding of what is actually going on in that process. Please follow along with the installation process:

1. Once you encounter the splash screen for SharePoint 2019, choose **Install SharePoint Server** under the **Install** menu:

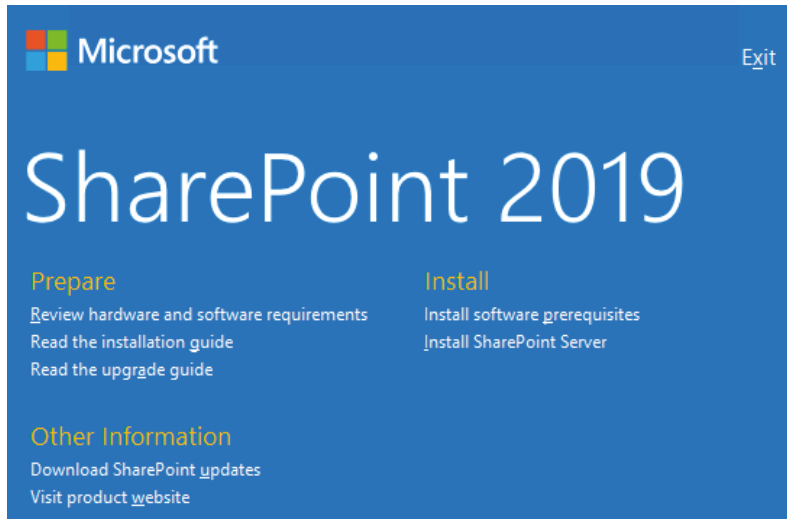


Figure 4.24 – The splash screen Install SharePoint Server option

2. Check the box to accept the terms of the license agreement and click **Continue**:

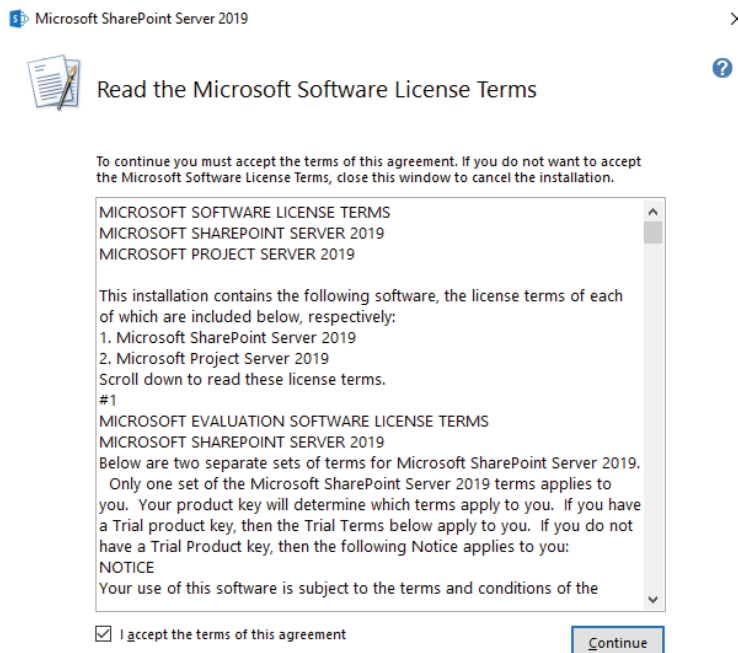


Figure 4.25 – License agreement

3. Enter the license key for the product:

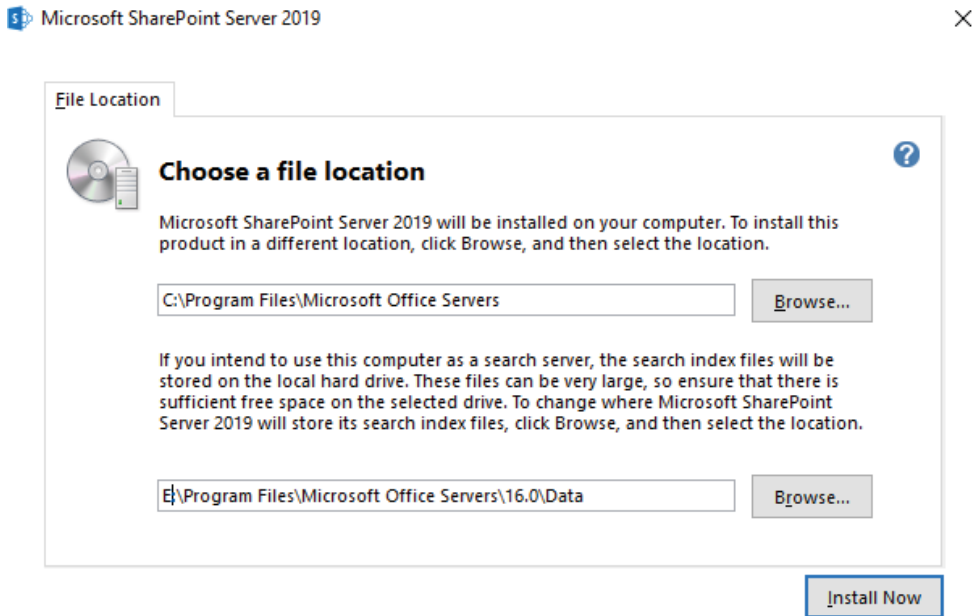


Figure 4.26 – Product key entry

4. Choose the file locations for the installation. This screen is very important for setting up the application file locations and then your data location. Click **Install Now** to continue the installation:

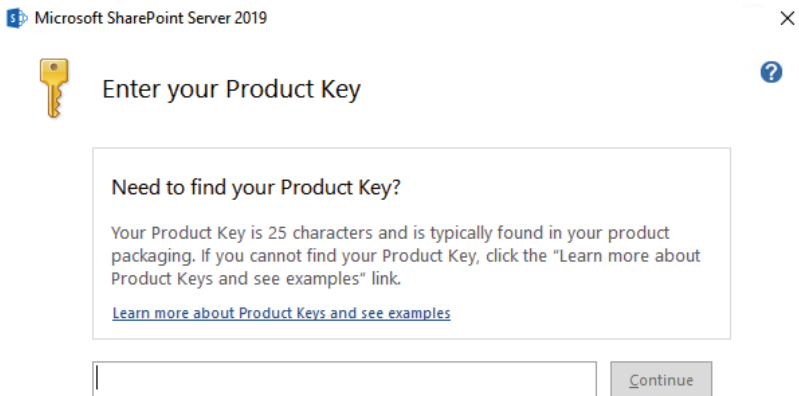


Figure 4.27 – Install Now

Tip

Make sure to change the data location as I have stated earlier to have at least two drives available, one for the operating system and then another for data, which will house your logs and search index. Also, make sure to create the logging and data drive large enough to grow your intended logs and search data, which you will need for now and a 2 to 3 year period.

5. Monitor the progress of the installation for SharePoint Server 2019:

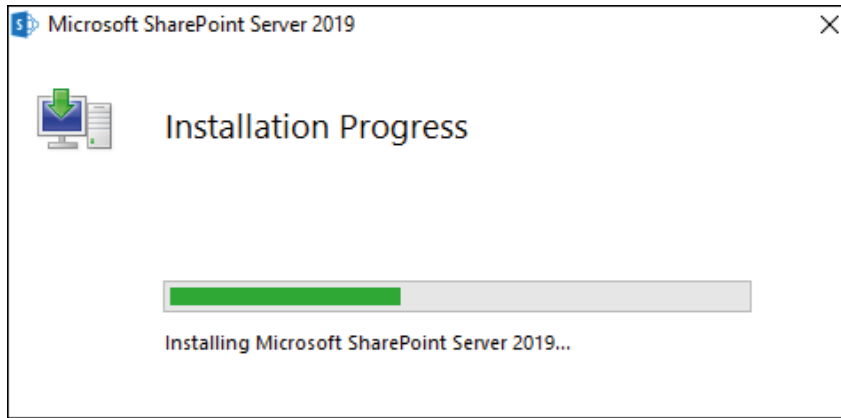


Figure 4.28 – Installation in progress

6. Once the product has been installed, you will come to the **Run Configuration Wizard** screen. Please uncheck the box and click **Close**:

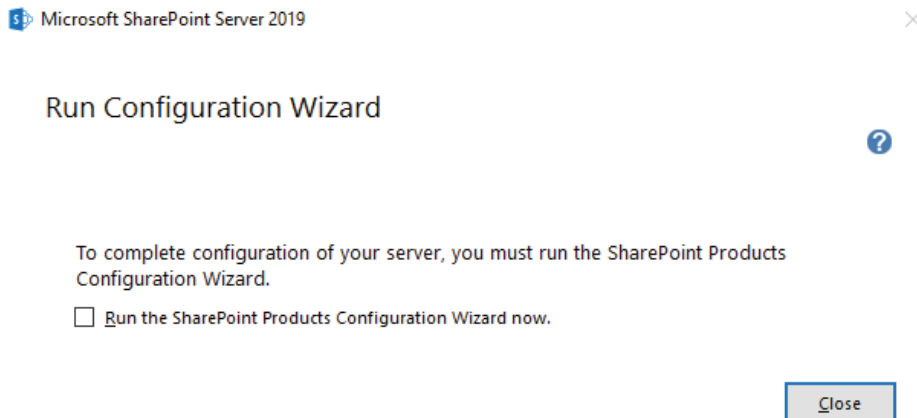


Figure 4.29 – Run Configuration Wizard

At this point, we will use a PowerShell script to configure our farm.

Configuration of SQL and SharePoint

So, now that we have all our servers installed, there are a few details we need to configure to make all these components work together for SharePoint and SQL Server. We will start with the following configurations:

- SQL alias creation
- Alias setup on SQL Server

We will use SQL aliases for the connectivity from SharePoint to the SQL server, so if we lose our SQL server, we can recreate the SQL server and use the same alias to connect to the farm from our SharePoint servers, and then our database server name never changes. You cannot do this using a named instance of a SQL server that is being used as the connecting SQL server name in your SharePoint farm.

Other areas of the configuration, such as logging, monitoring, and services, will be explained in *Chapter 5, Farm and Services Configuration*. These will be the SharePoint configurations needed to get ready to install service applications, use databases, and set server locations further. The following steps show the configuration for database connectivity settings so that we can complete the installation of SharePoint Server 2019:

1. Find **cliconfg** in your server to configure your SQL alias connection:

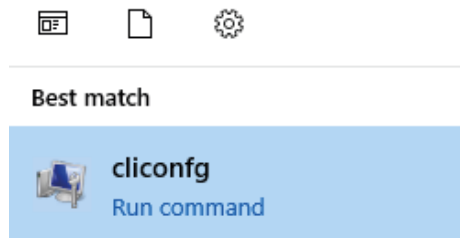


Figure 4.30 – Finding cliconfg

2. Run the application as an administrator:

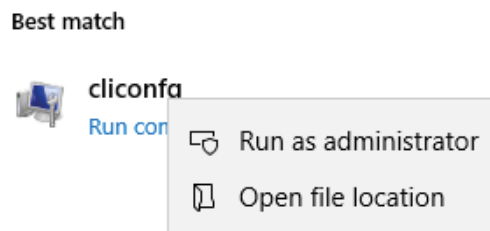


Figure 4.31 – Running as an administrator

3. Enable **TCP/IP**:

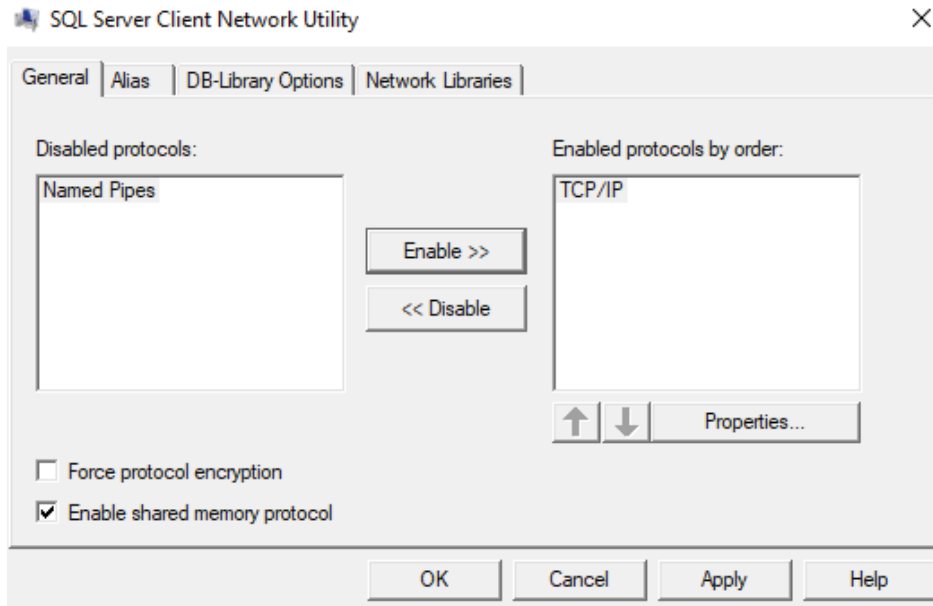


Figure 4.32 – SQL Server Client Network Utility

4. Configure the **TCP/IP** setting, as shown, giving it an alias name and the server name of the SQL server:

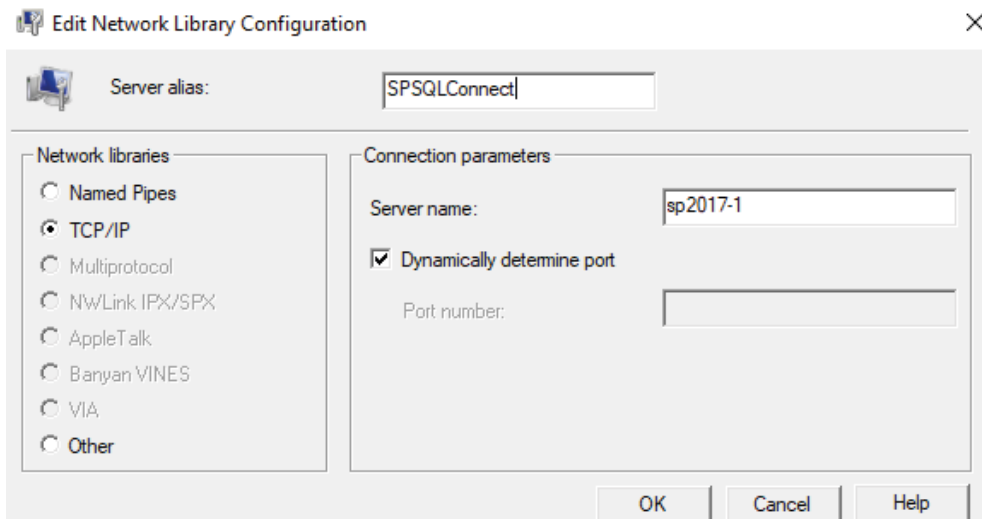


Figure 4.33 – Edit Network Library Configuration

Important Note

You can dynamically determine the port by keeping the checkbox checked, which sets the port on its own, or you can set the port manually to a different port other than 1433, which is the default for SQL connectivity.

5. Click **Apply**, and then **OK** to finish:

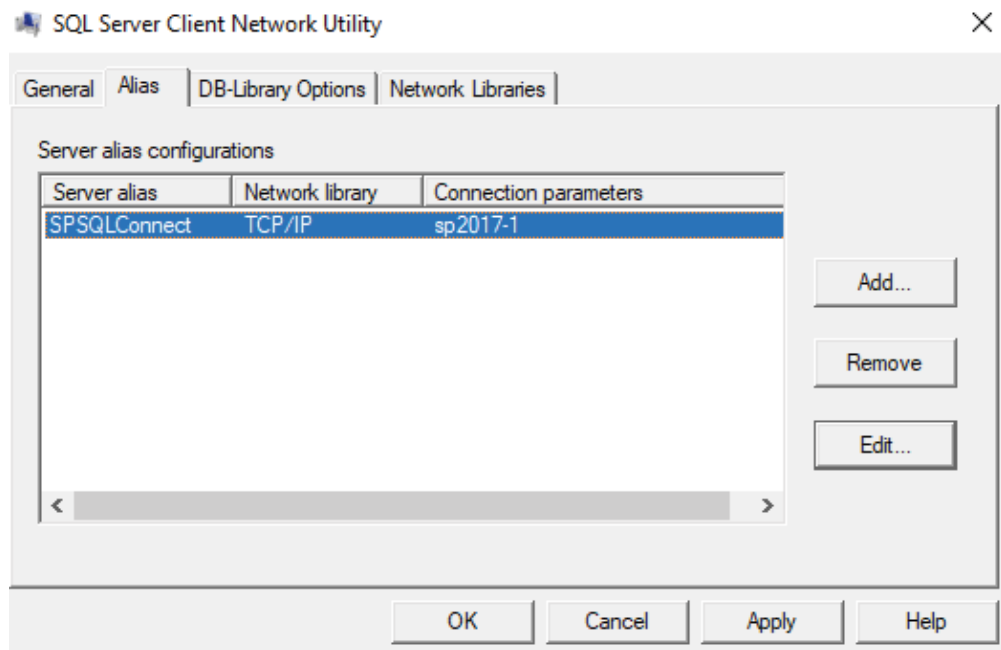


Figure 4.34 – SPSQLConnect server alias

6. Now, we will test the alias we just created using ODBC. Open **Administrator Tools** from the server and click on **ODBC Connectivity for 64 bit**. Once open, select **SQL Server** to create a new data source and click **Finish**:

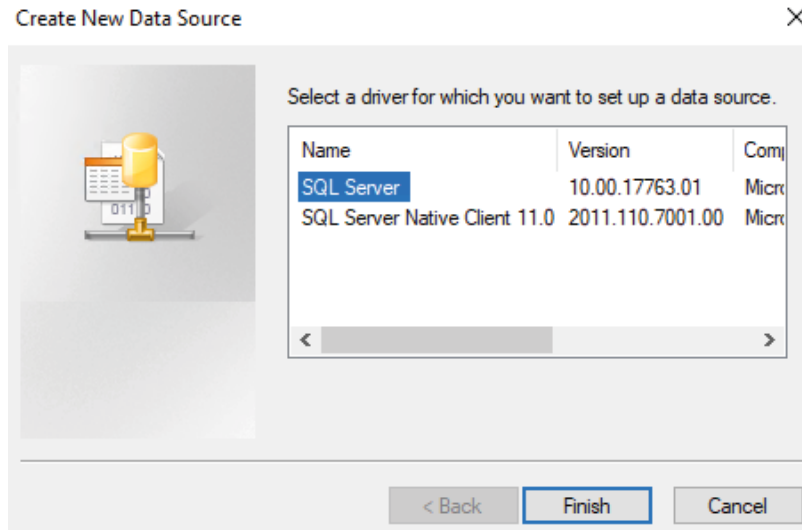


Figure 4.35 – Create New Data Source

- After clicking **Finish**, you will be prompted with a new window to create a new data source. Input a name and a description of the data source and the SQL server you are connecting to. The connected SQL server you are testing is the alias name you created in *Step 5*. Then, click **Next**:

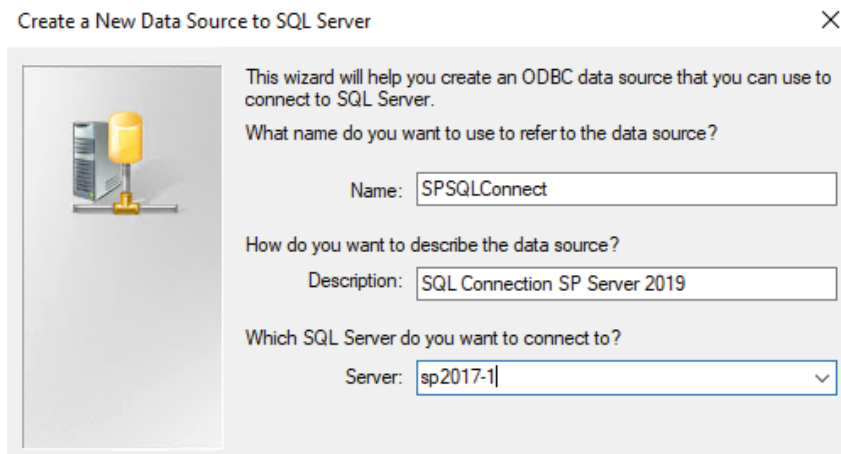


Figure 4.36 – Inputting a name/description/server

- Click **Next** to continue, which will test connectivity to your SQL server using the alias name:

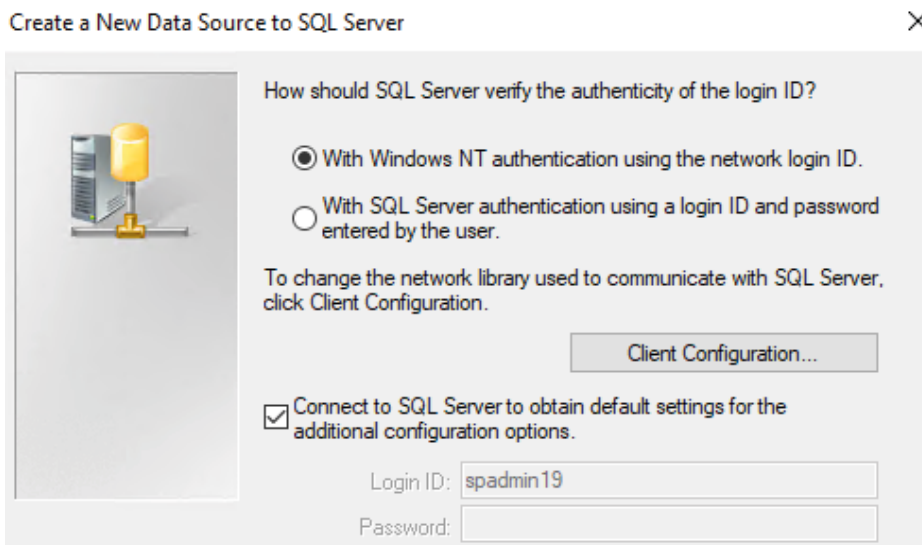


Figure 4.37 – Testing connectivity

We have now successfully connected to SQL Server 2017 to support our SharePoint farm.

Running the configuration script

To start the process of creating your farm, you will need to open PowerShell and follow the steps given here. We will create our farm using a PowerShell script so that we can name all of our databases:

Note

With the new SharePoint 2016 and SharePoint 2019 servers, we now need to use a new parameter: `$ServerRole`. This determines the `MinRole` that will be used on this server resource.

- Copy the script from GitHub called `FarmCreation.ps1` and run this script to create your farm. Remember to change the fields where needed:

```
Add-PSSnapin "Microsoft.SharePoint.PowerShell"
#Configuration Settings
$DatabaseServer = "SPSQLCONNECT"
$ConfigDatabase = "2019_Farm_Config"
```

```
$AdminContentDB = "2019_Farm_Content_Admin"
$Passphrase = "ENTER A PHRASE"
$FarmAccountName = "Domain\SP_Farm"
$ServerRole="APPLICATION"
#Get the Farm Account Credentials
$FarmAccount = Get-Credential $FarmAccountName
$Passphrase = (ConvertTo-SecureString $Passphrase
-AsPlainText -force)
#Create SharePoint Farm
Write-Host "Creating Configuration Database and Central
Admin Content Database..."
New-SPConfigurationDatabase -DatabaseServer
$DatabaseServer -DatabaseName $ConfigDatabase
-AdministrationContentDatabaseName $AdminContentDB
-Passphrase $Passphrase -FarmCredentials
$FarmAccount -LocalServerRole $ServerRole
-SkipRegisterAsDistributedCacheHost
$Farm = Get-SPFarm -ErrorAction SilentlyContinue
-ErrorVariable err
if ($Farm -ne $null)
{
Write-Host "Installing SharePoint Resources..."
Initialize-SPResourceSecurity
Write-Host "Installing Farm Services ..."
Install-SPService
Write-Host "Installing SharePoint Features..."
Install-SPFeature -AllExistingFeatures
Write-Host "Creating Central Administration..."
New-SPCentralAdministration -Port 2019
-WindowsAuthProvider NTLM
Write-Host "Installing Application Content..."
Install-SPAApplicationContent
Write-Host "SharePoint 2019 Farm Created Successfully!"
}
```

Important Note

Install-SpHelpCollection is no longer needed in our script as part of the SharePoint 2019 configuration. Also, if -LocalServerRole \$ServerRole is not specified, the server will be created as a custom role. We also do not want to create a Distributed Cache service on this initial app server. So, we will include -SkipRegisterAsDistributedCacheHost.

2. Monitoring progress: As you wait for the script to run, check the SQL server by refreshing the databases to see whether databases have started to be created:

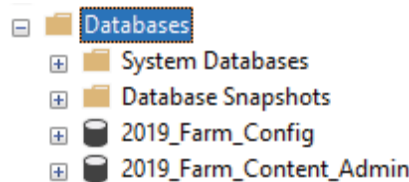


Figure 4.38 – Checking the database creation status

3. Once the script is finished, you will see that that farm was created successfully:

VisioProcessRepositoryFeatu...	7e0aabee-b92b-4368-8742-21ab16453d00	15	Farm
VisioProcessRepositoryUs	7e0aabee-b92b-4368-8742-21ab16453d02	15	Web
VisioServer	5fe8e789-d1b7-44b3-b634-419c531cfdca	15	Farm
VisioWebAccess	9fec40ea-a949-407d-be09-6cba26470a0c	15	Site
WAWhatsPopularWebPart	8e947bf0-fe40-4dff-be3d-a8b88112ade6	15	Site
WAWhatsPopularWebPart	8e947bf0-fe40-4dff-be3d-a8b88112ade6	15	Site
ExcelServer	e4e6a041-bc5b-45cb-beab-885a27079f74	15	Farm
ExcelServerSite	3cb475e7-4e87-45eb-a1f3-db96ad7cf313	15	Site
MobileEwaFarm	5a020a4f-c449-4a65-b07d-f2cc2d8778dd	15	Farm
MobileExcelWebAccess	e995e28b-9ba8-4668-9933-cf5c146d7a9f	15	Site
ExcelServer	e4e6a041-bc5b-45cb-beab-885a27079f74	15	Farm
ExcelServerSite	3cb475e7-4e87-45eb-a1f3-db96ad7cf313	15	Site
MobileEwaFarm	5a020a4f-c449-4a65-b07d-f2cc2d8778dd	15	Farm
MobileExcelWebAccess	e995e28b-9ba8-4668-9933-cf5c146d7a9f	15	Site
Creating Central Administration...			
Installing Help...			
Installing Application Content...			
SharePoint 2019 Farm Created Successfully!			

Figure 4.39 – Farm created successfully

4. Navigate to **Central Administration**, and now the Central Administration site is ready for configuration:

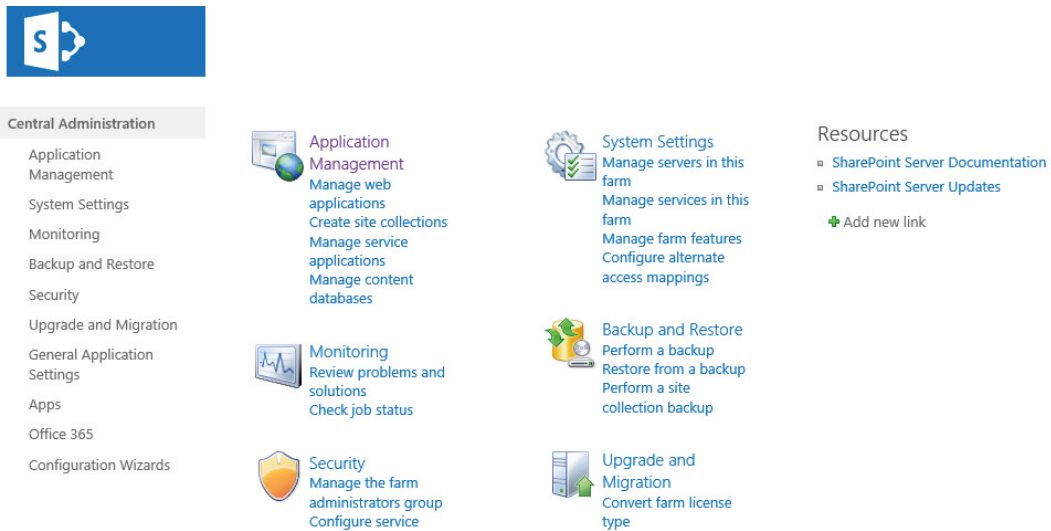


Figure 4.40 – Central Administration

We will start that configuration in the next chapter.

Remote installations

You can install using remote installations, where you can use AutoSPInstaller to install SharePoint on multiple servers using one script from one server. The script first installs SharePoint locally to establish a baseline installation on the local server where the script is being executed. The script then installs SharePoint remotely using PowerShell Remoting and **Windows Remote Management (WinRM)** on the other servers you have configured in the script. These installations can be done all at once in a parallel or serial process based on the configuration file. WinRM must be enabled on the servers where you want SharePoint to be installed remotely. To learn more about remote installation, find AutoSPInstaller at the following link or review GitHub for more information: <https://autospinstaller.com/>.

Summary

If you are familiar with SharePoint, you can see that not a lot has changed in the installation process. There have been some cool additions to help with the process, but overall, we can see that if you know SharePoint installation, you can get through this pretty easily. The key things to remember are using the MinRoles, setting logging locations correctly, reviewing scripts, and installing all the prerequisites for the server, SQL and SharePoint, before installing.

In the next chapter, we will go through more configurations and understand how to put this farm altogether. There are many steps and variations to this configuration that we cannot cover in this book. We condensed as much as possible into the scope of the book. Although we are very clear about setting some areas of the configuration, you will see that some areas can be customized, which we will state in the following chapters.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. Why should we use a script to create our farm and not the configuration wizard?
2. If we lost our SQL server due to a disaster, we could recover our databases on a named SQL Server instance and reconnect the farm with no issues. True or False?
3. When installing our SharePoint servers, which firewall port supports Office Online Server?
4. Local policy is needed when installing SharePoint. Why?
5. Domain policies can interfere with the configuration of SharePoint and SQL Server. True or False?
6. If I wanted to install my farm and other server resources all in one executed script, can I use PowerShell to do so?
7. What parameter in our farm creation script is needed only for SharePoint Server 2016 and 2019?

5

Farm and Services Configuration

SharePoint's key to success is the services it provides. In this chapter, we'll learn how to make all the necessary performance tweaks, as well as how to configure the services related to logging, monitoring, and integrating services that support content, plus other application integrations. SharePoint, as a product, changes with every version, so expect to see some changes in terms of how these services are configured and supported.

Security will also be reviewed in this chapter: besides the services SharePoint provides, we need to look at the service accounts that support them. Application pool best practices and other areas that can be configured will also be covered; there has always been some speculation on the best practices surrounding these areas of security and application pools.

Knowing which services support which resources of the platform will also be mentioned in this chapter. We need to understand how to use our MinRoles as we add more servers to the farm, as well as what services those applications support. We also need to know how to make the best choices when adding these server roles and resources to the environment. To do this, we need to follow the design for the farm we finished and follow best practices.

The following topics will be covered in this chapter:

- Configuring SQL Server services
- Configuring SharePoint services
- Antivirus and security configurations
- Creating service applications
- SharePoint MinRole resources
- Understanding the Distributed Cache service

Let's get started!

Technical requirements

For you to understand this chapter and the knowledge provided, you will need the following:

- 2-3 years of experience using PowerShell and SharePoint
- 2-3 years of experience using SQL Server
- A good understanding of the SharePoint architecture
- The link to this book's GitHub repository: <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>

Configuring SQL Server services

In *Chapter 4, Installation Concepts*, we learned how to install HOSTs and VMs in order to support our environment before installing the main applications for our farm configuration on SQL Server 2017 and SharePoint Server 2019. Although we have done this, there is so much more to do, as we will see in this chapter and others to come. We still have some server configurations to finish and services to configure in the farm before we can create some web applications and test them.

SQL Server is the main component and the foundation of the SharePoint Server Farm. Without it, we cannot support SharePoint in any way. So, since this server supports all the data that will be used for configuration, services, content, and security, we really need to make sure that this part of our farm is performing up to par and has been configured to support the farm through growth, redundancy, and performance.

We have compiled a list of areas we want to change and/or update as part of our SQL Server configuration that help us create databases and improve their perform on existing databases. These changes must be made so that there's better support for SharePoint Farm. This is because SharePoint uses SQL Server as its central repository for configuration, services, and content. Please make the changes mentioned in the following subsections while ensuring they support the servers you have built as part of your farm.

SQL properties

Now that we have successfully installed SQL Server, we need to check its configuration. Start by right-clicking the server's name:

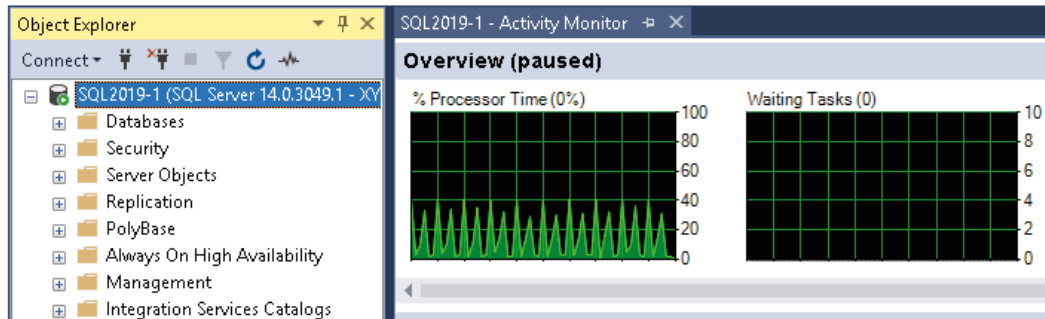


Figure 5.1 – SQL Activity Monitor

Selecting **Properties** in SQL Server Management Studio will present the property settings for the server:

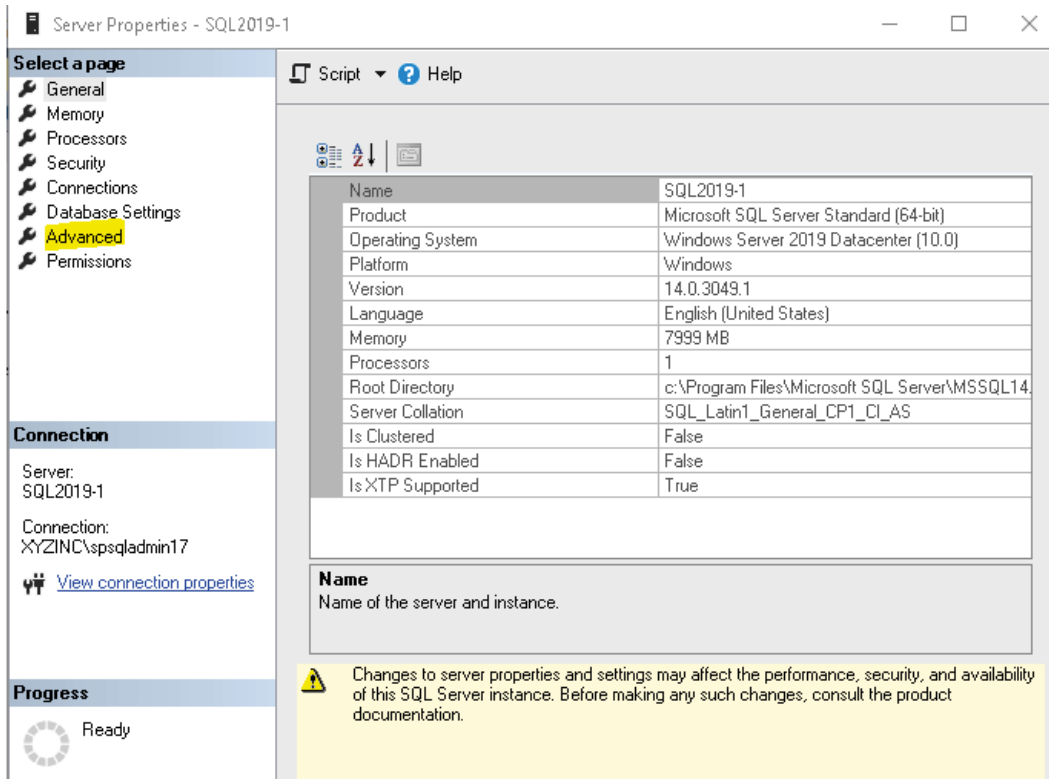


Figure 5.2 – SQL Server properties

These settings show how SQL Server has been configured. Note that some of these properties need to be changed for SQL Server to support SharePoint. We will look at these properties next.

SQL Server MAXDOP settings

As part of SQL Server's configuration, SharePoint is only supported when SQL Server is being used as the backend. It is also a best practice to set the **MAX Degree of Parallelism (MAXDOP)** on any SQL Server to 1. This setting is recommended by Microsoft for SQL servers that support SharePoint Server. As stated in prior chapters, Microsoft tests their products and tunes them to ensure they provide the best performance. Setting MAXDOP to 1 ensures that queries and calls from SharePoint are processed efficiently. This setting is required, and SharePoint will update the SQL configuration when you install the product. We must do this before we start our installation.

Use the following commands to change the value of SQL Server once it has been installed. In newer versions of SharePoint, this setting is set automatically, but if you see that it is not set to 1, please do so using the following SQL query:

```
sp_configure 'show advanced options', 1;
GO
RECONFIGURE WITH OVERRIDE;
GO
sp_configure 'max degree of parallelism', 1;
GO
RECONFIGURE WITH OVERRIDE;
GO
```

Within the configuration, please make sure that the following areas have been updated and set to support SharePoint Server 2016 and the performance of SQL Server:

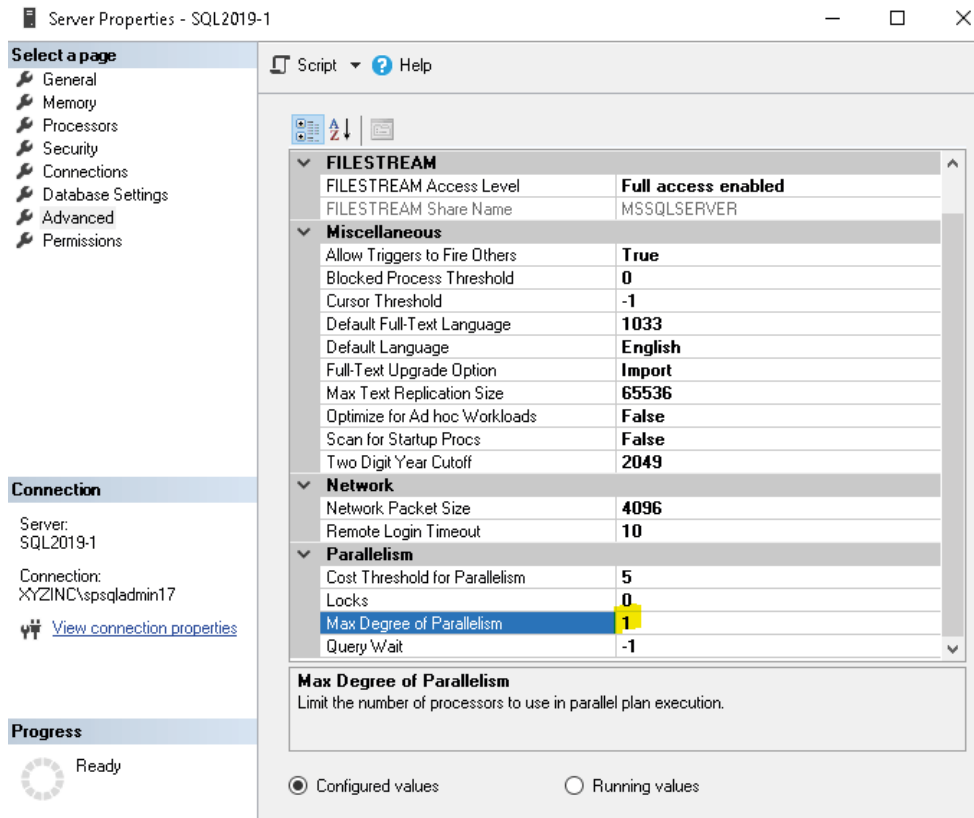


Figure 5.3 – MAXDOP setting in Server Properties

Setting SQL file default locations

To ensure we remain consistent with the configuration that was explained in *Chapter 2, Planning and Architecture*, we need to make sure we define the general areas of our SQL configuration, as shown in the following screenshot. Typically, you will not use this standard configuration, especially if you're following my guidance of using LUNNS for each type of database SharePoint creates. This is typically done using a manual database creation process so that you can set the locations of the databases and logs. This configuration will give you better performance, and using separate drives gives you separation of those processes as well. As we mentioned previously, the following screenshot shows the general areas of your SQL configuration:

Database default locations	
Data:	C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\MSSQL\DATA\
Log:	C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\MSSQL\DATA\
Backup:	C:\Program Files\Microsoft SQL Server\MSSQL14.MSSQLSERVER\MSSQL\Backup

Figure 5.4 – Default locations

Set the default locations for the **Data** files (.mdf files) and **Log** files (.ldf files). These files need to be separated. Here, the best option is to split the files up by database type, as discussed in the SQL Server Preparation. The backup location should be set using the default setting for any Maintenance Plans you plan to use within SQL Server. If you are using a third-party application to manage your databases, this setting will not matter.

Instant file initialization

We need to make changes to the model database so that it has enough space to create templates for our newly created databases. These changes will help us create databases faster and bring a different level of performance to adding new clients that would like to have separation within content databases:

```
Alter Database [model] MODIFY FILE (NAME = modeldev, SIZE = 150mb, MAXSIZE = Unlimited
```

Once you have run this SQL command, you will see the following message, stating that you have successfully applied the setting:

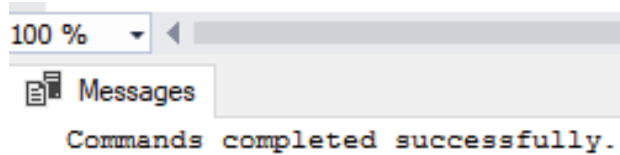


Figure 5.5 – Commands completely successfully message

Now that we have updated the property for the model database, we will review our authentication method.

Reviewing our authentication method

When checking our properties, we will notice that we can set the authentication of SQL Server in two ways; that is, **Windows Authentication mode** or **SQL Server and Windows Authentication mode**:

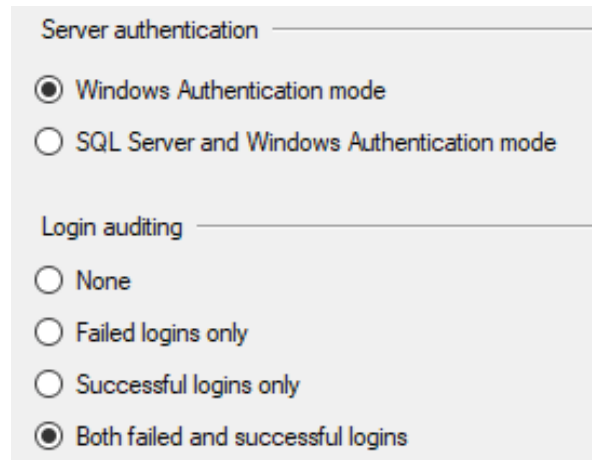


Figure 5.6 – Selecting an authentication method in SQL Server

Windows Authentication mode should be the option that's highlighted. SQL Server mode should not be included in our configuration for SharePoint server since the product is fully integrated with Active Directory. Allowing connections with SQL Server will only bring about vulnerabilities in terms of security.

Our SQL configuration is now complete. If there are other integrations and settings you need to work on so that SQL Server supports SharePoint, please complete them now.

Configuring SharePoint Services

Configuring SharePoint Services is the first thing we must do before creating web applications that hold content for our users. In this section, we will start adding services to our farm and configuring areas for monitoring and logging. The following exercises will help us complete all the preparation we need to do to support the creation of web applications that serve our user's communities. This will allow them to start using the farm to share content and use the services provided.

There are different methods you can use to configure your SharePoint farm; that is, PowerShell, GUI, or AutoSPInstaller. Figure out what works best for you. In this book, we will be using a combination of PowerShell and GUI to show you how things are done from an illustrative perspective, though scripts that show you how to do this manually will also be provided. The reason we will be using both is so that those who may be new to SharePoint can follow along, especially if they are not very familiar with PowerShell.

So, let's get right to it!

Setting server logging locations

To help manage the disk space resources we have created for our servers, we must make sure that we point all growing files to a location that can handle the number of files that are generated by logging. The following areas will be moved to a new location within the server for growth purposes:

- IIS
- Diagnostic Logging
- Usage Logging
- Index (see Search configuration for details)

IIS is the service that runs SharePoint websites on the server and creates logs as part of the service. When you log into the IIS Manager, you will see the sites and application pools that are available and have been created, as shown in the following screenshot:



Application Pools

This page lets you view and manage the list of application pools on the server. Application pools are associated with worker processes, contain one or more applications, and provide isolation among different applications.

Filter: Go Show All Group by:				
Name	Status	.NET CLR V...	Managed Pipel...	Identity
.NET v2.0	Started	v2.0	Integrated	ApplicationPoolId...
.NET v2.0 Classic	Started	v2.0	Classic	ApplicationPoolId...
.NET v4.5	Started	v4.0	Integrated	ApplicationPoolId...
.NET v4.5 Classic	Started	v4.0	Classic	ApplicationPoolId...
Classic .NET Ap...	Started	v2.0	Classic	ApplicationPoolId...
DefaultAppPool	Started	v4.0	Integrated	ApplicationPoolId...
SecurityTokenS...	Started	v4.0	Integrated	XYZINC\SPFarm19
SharePoint Cent...	Started	v4.0	Integrated	XYZINC\SPFarm19
SharePoint Web...	Stopped	v4.0	Integrated	LocalService
SharePoint Web...	Started	v4.0	Integrated	XYZINC\SPFarm19

Figure 5.7 – IIS Application Pools window

The preceding screenshot shows what the application pools look like after a fresh install of SharePoint 2019. The SharePoint Web Services application pool should not be started, which is by design. When you select **Sites**, you will also see a list of sites that were created when you created your farm:

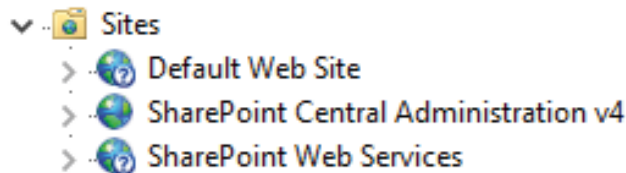
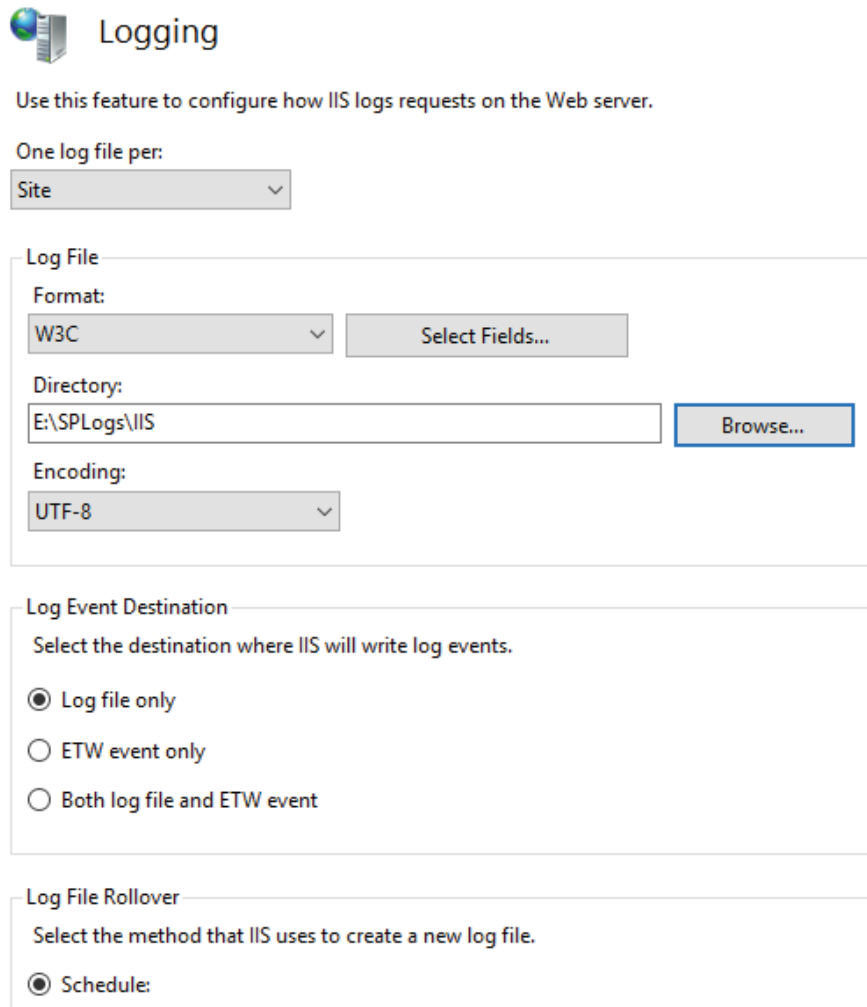


Figure 5.8 – IIS Default Web Site view

The preceding screenshot shows what you will see once you have performed a fresh installation of SharePoint on your first server. The first server will always include **Central Administration** as it is the key to setting up and configuring the rest of your SharePoint environment.

To get to the logging area of the IIS service, please click on the server's name and then select **Logging** from the list of available configuration areas in the middle of the screen:



Logging

Use this feature to configure how IIS logs requests on the Web server.

One log file per:
Site

Log File

Format:
W3C Select Fields...

Directory:
E:\SPLogs\IIS Browse...

Encoding:
UTF-8

Log Event Destination

Select the destination where IIS will write log events.

☒ Log file only
☐ ETW event only
☐ Both log file and ETW event

Log File Rollover

Select the method that IIS uses to create a new log file.

☒ Schedule:

Figure 5.9 – IIS Logging settings

Since we are SharePoint administrators, there is also a tool called ULS Viewer we can use that can help with reading logs and troubleshooting issues that may arise. Please use this tool to view logs as it brings added clarity, along with the functionality to manage logs, considering how large SharePoint logs tend to be.

While we're configuring logging, we want to make sure that all the logs are collected by **Site**, which is the default option. The **Directory** location needs to be changed here. As shown in the preceding screenshot, I have changed mine to reflect the second drive on my server. This should be done on every server in the farm, including SQL, to make sure you set the location to a drive that has the capacity to hold the log. After setting the location of the file, you can set your preferences in terms of **Log Event Destination** and **Schedule**. You can also customize the fields you would like to see in your logs since you may want to add more detail to your log captures.

Select the information you would like to collect, as well as the schedule, from the following configuration parameters:

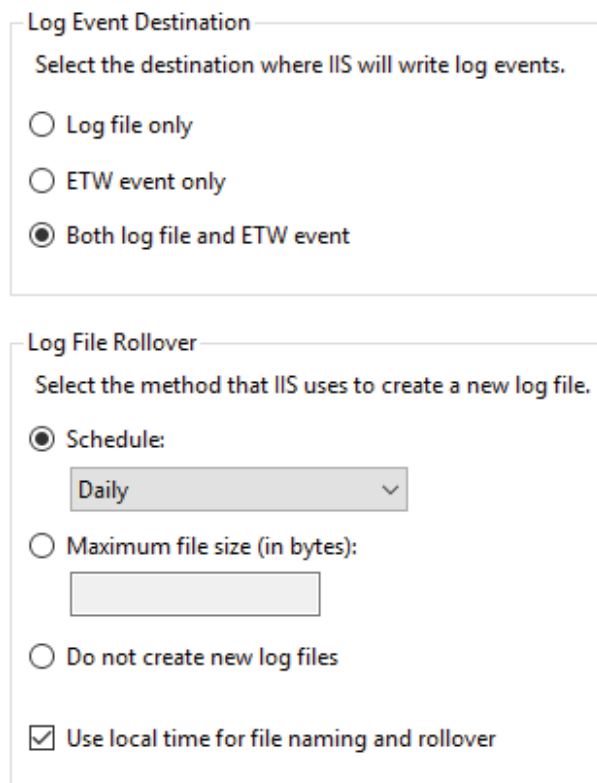
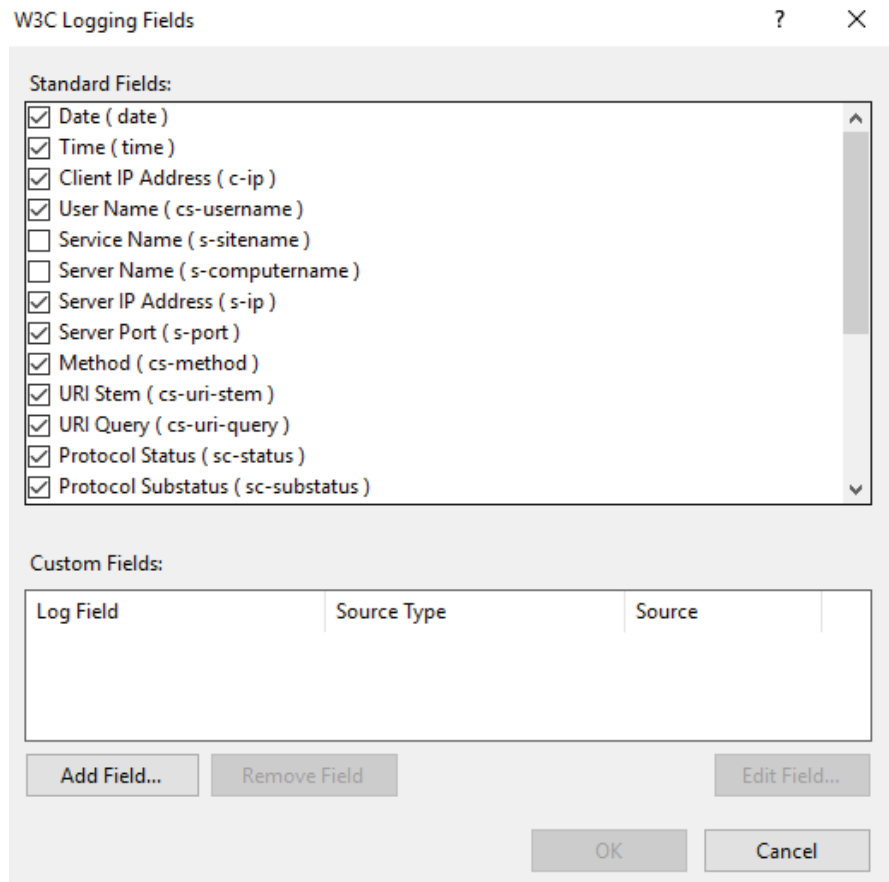
The image shows two configuration sections from the IIS Manager. The first section, 'Log Event Destination', has a title bar and a description 'Select the destination where IIS will write log events.' It contains three radio button options: 'Log file only', 'ETW event only', and 'Both log file and ETW event', with the third option selected. The second section, 'Log File Rollover', also has a title bar and a description 'Select the method that IIS uses to create a new log file.' It contains three radio button options: 'Schedule:', 'Maximum file size (in bytes):', and 'Do not create new log files'. The 'Schedule:' option is selected, and it is followed by a dropdown menu currently showing 'Daily'. Below this is an empty text input field for the 'Maximum file size' option. At the bottom of the section is a checked checkbox labeled 'Use local time for file naming and rollover'.

Figure 5.10 – Log Event Destination and Log File Rollover settings

I have set **Schedule** to **Daily** so that I get a daily log of the site for troubleshooting if needed. The daily log file's size depends on the user traffic. So, the more users you have, the bigger these files become. Also, remember that these logs are kept by site. You can always change this if you like to place them in one server log file. However, this is not something I recommend.

If you click on the **Select Fields** button on the main screen, you will be brought to the following selection screen:



The image shows a dialog box titled "W3C Logging Fields" with a question mark icon and a close button (X) in the top right corner. The dialog is divided into two main sections: "Standard Fields:" and "Custom Fields:". The "Standard Fields:" section contains a list of 13 items, each with a checkbox and a label: "Date (date)", "Time (time)", "Client IP Address (c-ip)", "User Name (cs-username)", "Service Name (s-sitename)", "Server Name (s-computername)", "Server IP Address (s-ip)", "Server Port (s-port)", "Method (cs-method)", "URI Stem (cs-uri-stem)", "URI Query (cs-uri-query)", "Protocol Status (sc-status)", and "Protocol Substatus (sc-substatus)". The first 12 items have their checkboxes checked, while the "Service Name" item is unchecked. The "Custom Fields:" section contains a table with three columns: "Log Field", "Source Type", and "Source". The table is currently empty. Below the table are three buttons: "Add Field...", "Remove Field", and "Edit Field...". At the bottom of the dialog are two buttons: "OK" and "Cancel".

Standard Fields:
☒ Date (date)
☒ Time (time)
☒ Client IP Address (c-ip)
☒ User Name (cs-username)
☐ Service Name (s-sitename)
☐ Server Name (s-computername)
☒ Server IP Address (s-ip)
☒ Server Port (s-port)
☒ Method (cs-method)
☒ URI Stem (cs-uri-stem)
☒ URI Query (cs-uri-query)
☒ Protocol Status (sc-status)
☒ Protocol Substatus (sc-substatus)

Log Field	Source Type	Source
-----------	-------------	--------

Buttons: Add Field..., Remove Field, Edit Field..., OK, Cancel

Figure 5.11 – Selecting IIS Logging Fields

In the **Standard Fields** section of the window, you can set which fields you would or wouldn't like to be displayed in your logs. If you would like to log more information, you can also use the **Add Field** option to include fields that may be missing based on your preference. Again, these fields help you troubleshoot issues that may arise during the farm's existence.

Next, we will learn how to create the state service and logging service. The state service serves as a shared service and is used by some components to store temporary data in SQL databases related to HTTP requests. InfoPath Forms Services requires the state service to be available for it to function correctly. The logging service is used to collect logs about the SharePoint environment for troubleshooting and finding issues within the farm.

Creating the state service

The state service is used as a connectivity service within SharePoint that supports publishing, searching crawl and query components, the Visio service, and various other services within SharePoint. This service is one of the first services I install because it is a foundation service you do not want to forget.

To create this service, you will need to use PowerShell:

```
$db = New-SPStateServiceDatabase -Name "XYZ State Service  
Application"  
$sa = New-SPStateServiceApplication - Name "XYZ_State_Service"  
-Database $db  
New-SPStateServiceApplicationProxy -Name "XYZ State Service  
Application Proxy" -ServiceApplication $sa  
-Default Proxy Group
```

Always run PowerShell using the run as administrator option so that you are using your administrative privileges while running commands and scripts. If you do not, your process will fail.

Creating SharePoint logging services

Central Administration, as its name suggests, is an administrative website that controls all the servers that have been configured as part of the SharePoint farm. When you set logging locations within the Central Administration site, those locations need to be the same on all servers since the location is looked for on all servers associated with the farm. If you change any locations during the farm's existence, please remember to also make those changes and folder updates on all servers.

Let's install the logging services within SharePoint by performing the following steps:

1. Navigate to the **Central Administration** link on your server, right-click it, and run as administrator. Then, click the **Start** button and right-click the SharePoint Central Administration icon and run as administrator. Never open this area without running as administrator. You can also set this up on your taskbar and run as administrator as well. You will see the following screen, which is your **Central Administration** site:

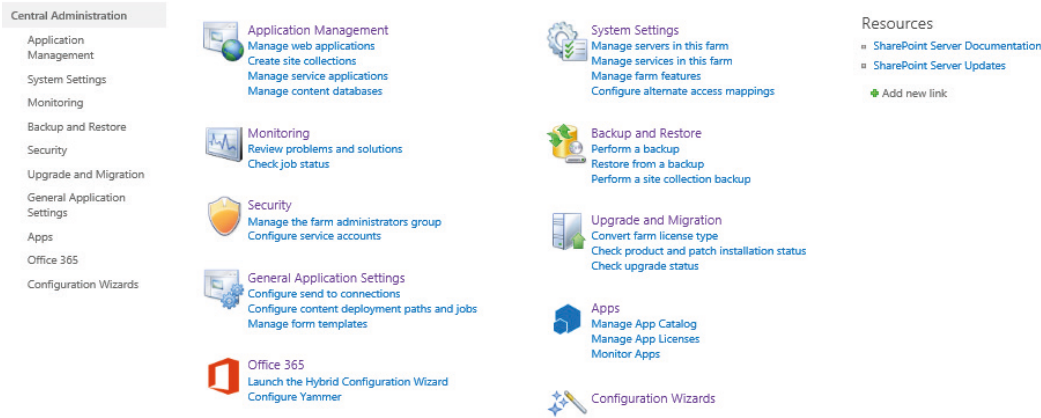


Figure 5.12 – Central Administration site

There are lots of areas within the site. However, we will only be working on a few of these in this book.

2. We will start with the **Monitoring** area of this menu. Click on the **Monitoring** link in the **Central Administration** site:

Monitoring

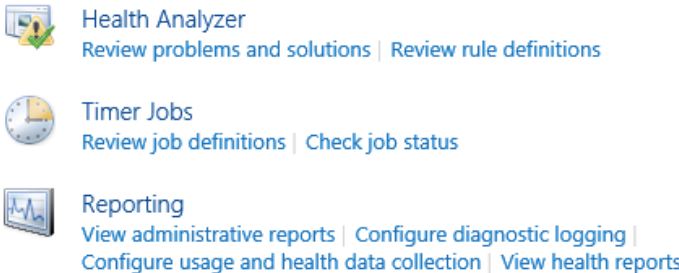


Figure 5.13 – Monitoring configuration

A menu will appear for working with the monitoring aspects of the farm's configuration.

3. Click on **Configure diagnostic logging**. In this area, we want to select **All Categories** and click the box next to the selection we want to hone in on during our log capture. Find out more about these categories and figure out the areas you are looking to target as part of your troubleshooting efforts:

Diagnostic Logging

Event Throttling

Use these settings to control the severity of events captured in the Windows event log and the trace logs. As the severity decreases, the number of events logged will increase.

You can change the settings for any single category, or for all categories. Updating all categories will lose the changes to individual categories.

Select a category

Category

- ☒ All Categories
- ☐ Access Services
- ☐ Access Services 2010
- ☐ Business Connectivity Services
- ☐ Conversion Service
- ☐ Document Conversions
- ☐ Document Management Server
- ☐ eApproval
- ☐ Education
- ☐ Excel Services Application
- ☐ InfoPath Forms Services
- ☐ Office Automation Services
- ☐ Office Services Infrastructure
- ☐ PerformancePoint Service
- ☐ Project Server
- ☐ Search
- ☐ Secure Store Service
- ☐ Services Infrastructure
- ☐ SharePoint Express
- ☐ SharePoint Foundation
- ☐ SharePoint Foundation Search
- ☐ SharePoint Portal Server
- ☐ SharePoint Server

Figure 5.14 – Diagnostic logging configuration – I
Clicking on **All Categories** will select all the areas within the server.

- If you have specific areas you would like to monitor, you can select them individually as well:

Least critical event to report to the event log
None

Least critical event to report to the trace log
None

Event Log Flood Protection
Enabling this setting allows detection of repeating events in the Windows event log. When the same event is being logged repeatedly, the repeating events are detected and suppressed until conditions return to normal.

☒ Enable Event Log Flood Protection

Trace Log
When tracing is enabled you may want the trace log to go to a certain location. Note: The location you specify must exist on all servers in the farm.

Path
E:\SPLogs\Diagnostic
Example: %CommonProgramFiles%\Microsoft Shared\Web Server Extensions\16\LOGS

Number of days to store log files
14

Restrict Trace Log disk space usage
☒ Restrict Trace Log disk space usage
Maximum storage space for Trace Logs (GB)
1000

OK Cancel

Figure 5.15 – Diagnostic logging configuration – II

- On the same screen, after selecting your categories, we need to set the event log. Since we have just installed SharePoint, there is no need for detailed logging because we are not troubleshooting. So, for **Least critical event to report to the event log** and **Least critical event to report to the trace log**, select **None**.

As far as **Event Log Flood Protection** goes, you can choose to use this to suppress repeating events. This is your call. It does help with limiting the number of events you pick up in the Windows event log, but some people like it so that they know that the event is present.

- Now, we need to set the path of our **Trace Log**. We need to set the location of the second drive so that these logs can grow and not jeopardize our operating system. How many days do you want to keep your logs for? Again, this is your call. Set this setting based on the amount of days you may need to have these logs available. If you have lots of disk space, set the logs for longer periods.

Restrict the space on the trace logs using the next configuration tab. I have it set this to 1 GB. This is great for getting a good chunk of data but not having the system strain to open it on the server or transfer it to others.

7. We will now configure usage logging. Click on **Configure usage and health data collection** under the **Reporting** section:

Monitoring



Health Analyzer

[Review problems and solutions](#) | [Review rule definitions](#)



Timer Jobs

[Review job definitions](#) | [Check job status](#)



Reporting

[View administrative reports](#) | [Configure diagnostic logging](#) | [Configure usage and health data collection](#) | [View health reports](#)

Figure 5.16 – Monitoring configuration page

8. At the top of the configuration screen, please check the **Enable usage data collection** box:

Configure usage and health data collection ⓘ

Warning: This page is not encrypted for secure communication. User names, passwords, and any other information will be sent in clear text. For more information, contact your administrator.

Usage Data Collection

Usage data collection will log events whenever various events occur in your SharePoint deployment. Usage Logging enables analysis and reporting, but also uses system resources and can impact performance and disk usage.

☐ Enable usage data collection

Figure 5.17 – Enable usage data collection box

9. Choose all the events you would like to log:

Event Selection

Logging enables analysis and reporting, but also uses system resources and can impact performance and disk usage. Only log those events for which you want regular reports.

For sporadic reports or investigations, consider turning on logging for specific events and then disabling logging for these events after the report or investigation is complete.

Events to log:

- ☒ Administrative Actions
- ☒ Analytics Usage
- ☒ App Monitoring
- ☒ Asynchronous Feature Activation Job Usage
- ☐ Bandwidth Monitoring
- ☒ Content Export Usage
- ☒ Content Import Usage
- ☒ Database Maintenance Job Usage
- ☒ Database Wait Statistics
- ☒ Definition of usage fields for service calls
- ☒ Definition of usage fields for SPDistributedCache calls
- ☒ Definition of usage fields for workflow telemetry
- ☒ Delayed Content Type Activation Usage
- ☒ Feature Activation Resource Usage
- ☒ Feature Use
- ☒ File IO
- ☒ Page Requests
- ☒ REST and Client API Action Usage
- ☒ REST and Client API Request Usage
- ☒ RUM Global Provider Description
- ☒ Sandbox Requests (new)

Figure 5.18 – Event Selection

Most of these events should make sense to you, though some may not. Which ones you choose to log is up to you.

10. Select a location where the log file will exist. We will house these files in the folder on the second drive for our servers:

Usage Data Collection Settings
Usage logs must be saved in a location that exists on all servers in the farm. Adjust the maximum size to ensure that sufficient disk space is available.

Log file location:
E:\SPLogs\Usage

Health Data Collection
Health reports are built by taking snap shots of various resources, data, and processes at specific points in time.

☒ Enable health data collection

Click the link below to edit the health logging schedule.
[Health Logging Schedule](#)

Each element of the health logging system can be individual scheduled.

Log Collection Schedule
A time job collects log files from each server and copies events into a database that is used for reporting.

Click the link below to edit the log collection schedule.
[Log Collection Schedule](#)

Figure 5.19 – Selecting a log location

11. Please connect to the SQL alias database and then add the name of the database you would like to use. Remember to use the correct naming convention for your databases so that they are uniform:

Logging Database Server
Use of the default database server and database name is recommended for most cases. Refer to the administrator's guide for advanced scenarios where specifying database information is required.

Use of Windows authentication is strongly recommended. To use SQL authentication, specify the credentials which will be used to connect to the database.

Database Server
SPSQLConnect

Database Name
2017_UsageLog_Service X

Database authentication
☒ Windows authentication (recommended)
☐ SQL authentication

Account

Password

Figure 5.20 – Adding a database name

12. Click **OK** to finish.

With that, we have finished setting up our server login locations. Next, we will move on and understand the antivirus and security configurations within SharePoint Server 2019. These will help protect our farm from viruses and vulnerabilities.

Antivirus and security configurations

Antivirus and security help protect content, as well as block content that could potentially be damaging or lead to issues due to files containing viruses. These files can also create vulnerabilities in a SharePoint farm. Some of the areas that we need to look at are related to antivirus and security that protect us from threats from uploaded files, as well as files that can be uploaded onto our sites. The main areas for concern here are as follows:

- Antivirus settings
- Web Part Security
- Blocked File Types

Let's look at these areas in detail.

Antivirus settings

The antivirus settings are configured in the farm, while Web Part Security and Blocked File Types are set at the web application level. These settings should be taken very seriously. Since antivirus is usually related only to the server and its protection, antivirus is typically overlooked and is missed out during the installation process. Another reason for this being missed out on is because almost every admin I have met thinks that having antivirus on all their PCs and servers secures their content from viruses. From my experience, there have been instances where I have seen infected files get into a SharePoint site.

We should always make sure we configure the farm so that it's not vulnerable to the many different types of attacks that can be performed, and also secure it from all types of vulnerabilities. All incidents are created by overlooking steps in the configuration process, and deeming them as minimal can cause incidents. These types of vulnerabilities can be brought on easily, especially when you're hosting a SharePoint environment where the user does not understand security and you do not have control of the users' desktop.

As shown in the following screenshot, antivirus can be set in a few different ways, but again, you must have a product that integrates fully with SharePoint for these settings to work:

Antivirus ⓘ

Antivirus Settings

Specify when you want documents stored in document libraries and lists to be virus scanned, and whether you want your virus scanner to attempt to clean infected documents.

☐ Scan documents on upload

☐ Scan documents on download

☒ Allow users to download infected documents

☐ Attempt to clean infected documents

Antivirus Time Out

You can specify how long the virus scanner should run before timing out. If server response time is slow while scanning, you may want to decrease the number of seconds.

Time out duration (in seconds):

Antivirus Threads

You can specify the number of execution threads on the server that the virus scanner may use. If server response time is slow while scanning, you may want to decrease the number of threads allowed for virus scanning.

Number of threads:

Figure 5.21 – Antivirus settings

This is not only the virus scanning tool on the server, but it is an integrated component that works within sites so that files can be scanned.

The ideal configuration would be to install an antivirus scanner that works when integrated with SharePoint. This will allow your farm configuration to scan files when they're either uploaded or downloaded. Fortunately, there are a few top antivirus companies that offer this integration; previously, there was only Microsoft Forefront Server integration, which scanned files within SharePoint lists and libraries. To benefit from these features, you had to install and integrate this product.

SharePoint antivirus protection also occurs at the file level. Here, we need to make sure we not disrupt SharePoint and its file management process. For the following list of folders, we will need to make some exclusions. Configure all the SharePoint Server antivirus software so that the following folders and subfolders are excluded from antivirus scanning:

- Drive:\Program Files\Common Files\Microsoft Shared\Web Server Extensions

If you do not want to exclude the whole Web Server Extensions folder from antivirus scanning, you can just exclude the following folders:

- Drive:\Program Files\Common Files\Microsoft Shared\Web Server Extensions\16
- Drive:\Program Files\Common Files\Microsoft Shared\Web Server Extensions\16\Logs
- Drive:\Program Files\Microsoft Office Servers\16.0\Data\Office Server\Applications
- Drive:\Windows\Microsoft.NET\Framework64\v4.0.30319\Temporary ASP.NET Files
- Drive:\Windows\Microsoft.NET\Framework64\v4.0.30319\Config
- Drive: \Users\ServiceAccount\AppData\Local\Temp\WebTempDir

Note: The WebTempDir folder is a replacement for the FrontPageTempDir folder.

- Drive:\ProgramData\Microsoft\SharePoint
- Drive:\Users\account that the search service is running as\AppData\Local\Temp

Note: The search account creates a folder in the Gthrsvc_spsearch4 Temp folder, which must be periodically written to.

- Drive:\WINDOWS\System32\LogFiles
- Drive:\Windows\Syswow64\LogFiles

Note that if you use a specific account for SharePoint services or application pools identities, you may also have to exclude the following folders:

- Drive:\Users\ServiceAccount\AppData\Local\Temp

- `Drive:\Users\Default\AppData\Local\Temp`
- Any location where you decided to store the disk-based **binary large object (BLOB)** cache (for example, `C:\Blobcache`).
- `Drive:\inetpub\wwwroot\wss\VirtualDirectories` and all the folders inside it
- `Drive:\inetpub\temp\IIS Temporary Compressed Files`

SQL Server's antivirus settings will need to be configured in the same way on each SQL Server that is being used within the environment. So, if you have three nodes, all three servers would need this configuration on all servers. The exclusions needed for these servers are listed here.

As a best practice and to avoid downtime, please configure your SQL Server antivirus software settings so that the following file locations are not scanned. Doing this will help improve the performance of the server. This will also alleviate any files being locked while the SQL Server service is working. If some of these file types become infected, the antivirus software will not be able to detect this:

- SQL Server data files (`.mdf`, `.ndf`, `.ldf` files)
- SQL Server backup files (`.bak` and `.trn` files)
- Full-text catalog files
- Trace files (`.trc` files)
- SQL audit files for SQL Server 2008 or later versions (`.sqlaudit` files)
- SQL query files (`.sql` files)
- The directory that holds Analysis Services data
- The directory that holds Analysis Services temporary files, which are used during Analysis Services processing
- Analysis Services backup files
- The directory that holds Analysis Services log files
- Directories for any Analysis Services partitions that are not stored in the default data directory
- Filestream data files (SQL 2008 and later versions)

- Remote Blob Storage files (SQL 2008 and later versions)
- The directory that holds Reporting Services temporary files and logs (RSTempFiles and LogFiles)

The following are the processes you must exclude from virus scanning:

- %ProgramFiles%\Microsoft SQL Server\<Version.><Instance Name>\MSSQL\Binn\SQLServr.exe
- %ProgramFiles%\Microsoft SQL Server\<Version>.<Instance Name>\Reporting Services\ReportServer\Bin\ReportingServicesService.exe
- %ProgramFiles%\Microsoft SQL Server\MSAS13.<Instance Name>\OLAP\Bin\MSMDSrv.exe

Setting the antivirus on our server is very important and you will face issues if you do not set these areas correctly. There are many areas that need to be excluded, but it is worth configuring these areas so that they support your farm and its services. They will help the server run as it should without hindering performance and availability.

There are also other ways to protect data, including using security methods such as Data Compliance Protection in the cloud and Data Compliance Site Templates, both of which are available within SharePoint. You can find out more by researching these topics online. We will go over some of the aspects of these features later in this book.

Web Part Security

Web Part Security is the next area of concern we must tackle. We won't be configuring this at the moment since we do not have a web application for users yet. However, I am mentioning this here because this is part of how we set security within our sites. The following screenshot shows the available settings for Web Part Security:

✕

Security For Web Part Pages

Web Part Connections

Specify whether to allow users to connect Web Parts by passing data or values from a source Web Part to a target Web Part.

☒ Allows users to create connections between Web Parts.

☐ Prevents users from creating connections between Web Parts, and helps to improve security and performance.

Online Web Part Gallery

Specify whether to allow users access to the online Web Part gallery. Users can search, browse, and preview Web Parts and add them to Web Part Pages.

Note If your server is behind a proxy server or firewall, you may need to specify some additional settings to enable the online Web Part gallery. [Learn about specifying a proxy server.](#)

☒ Allows users to access the Online Web Part Gallery.

☐ Prevents users from accessing the Online Web Part Gallery, and helps to improve security and performance.

Scriptable Web Parts

Specify whether to allow contributors to edit scriptable Web Parts.

☐ Allows contributors to add or edit scriptable Web Parts.

☒ Prevent contributors from adding or editing scriptable Web Parts.

Restore Defaults
OK
Cancel

Figure 5.22 – Security For Web Part Pages

Web Part Security can be set either in the menu under **Security** in the Central Administration site or via web application using the application management area within the Central Administration site. Both options work and are associated with a web application when you choose to configure this setting. The big settings to look at here are the ones that prevent users from creating web part connections within the web application, allowing user access to the Online Web Part Gallery, and allowing contributors to add or edit scriptable Web Parts.

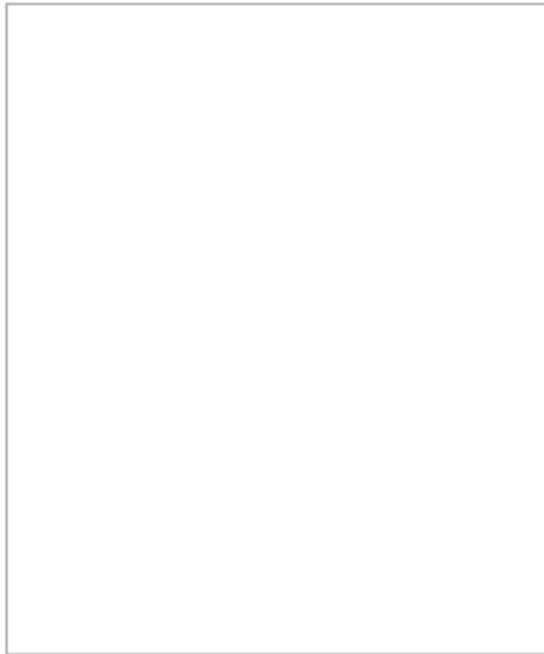
These are choices you should make based on the content within your web application. Within production environments, I would not want any of these settings to be allowed. The last thing you want is a user to make changes to a site that can affect the way it performs, or what the site is actually doing from an application standpoint. For example, you could have connected web parts in an application so that they display filtered content in another web part, but now you have an issue because one of the users made a change to the web part connection. Avoid these scenarios by limiting these areas, especially in production environments.

Block File Types

Configuration settings help prevent certain document extensions from being uploaded to SharePoint sites. This is great because some viruses run within certain types of files, and we can prevent those files from being uploaded programmatically using these settings. As shown in the following screenshot, in the **Blocked File Types** area, we would type the names of each extension; for example, .docx:

Blocked File Types ⓘ

Type each file extension on a separate line.

A large, empty rectangular box with a thin gray border, intended for users to type file extensions to be blocked. It occupies the central portion of the screenshot.

Filenames that include braces (for example, filename.{doc}) are blocked automatically.

Figure 5.23 – Blocked File Types

We are only using .docx files as an example here; we never want to block Word files. The following is a list of best practices when it comes to extensions:

File Type	Description
.ASHX	ASP.NET Web handler file. Web handlers are software modules that handle raw HTTP requests received by ASP.NET.
	ASP.NET Web Services source file .
.ASMX	
	JavaScript Object Notation file .
.JSON	
	Simple Object Access Protocol file .
.SOAP	
	Windows Communication Foundation (WCF) service file.
.SVC	
.XAMLX	Visual Studio Workflow service file .

Figure 5.24 – Best practices for extensions

Blocked File Types are powerful, especially when you may not want certain types of content in your farm. This helps ensure that files with certain extensions stay out of our libraries and do not get uploaded to the farm. Keeping these settings in check can help us know what kind of data is in our farm, as well as what kind of data should not be in our farm.

Creating service applications

Starting services within our farm is the first big task we need to complete before we can create sites for the user community. We must understand what services are needed for the farm, but also whether more than one web application will be created for the farm. The reason we need this information and why it's important is because if we do want to support more than one web application, we need to know what services are required for each web application.

In this section, you will learn how to configure services and find out what services you really need. In our planning session in *Chapter 2, Planning and Architecture*, I mentioned that this was something we should have looked at while planning. The reason why we must review those areas at the planning stage is because during our assessment, we looked at our old farm. When looking at our old farm, we found out what services were already running and what services will support the farm going forward. So, we have already started our list.

Now, we need to understand what those new services are and how they will be configured to support the farm. If you have not thought about this already, please make sure you do so before starting this section. In *Chapter 2, Planning and Architecture*, we went through this in detail, so you should be ready to start. If not, you will need to understand the following:

- Do I have enough server resources to support the farm?
- Do I need to segregate some of the services within the farm?
- What department needs what services?
- Do I create services that support all or some of the associated web applications?

In this section, we will create a matrix of services that can be individually dispersed across these web applications or shared between them. Whatever the case, we want to make sure we are managing our services so that we support the server resources that have been allocated for the farm, as well as the users who need these services within their sites. If security is a concern, then this will also play into how many services we create and what web applications they will support.

The following screenshot is our first glance at our **Services on Server** since we just created our new farm:

Services on Server ⓘ

Server: **SP2019-APP1** ▾ | Role: Application | View: **Configurable** ▾

Service	Status	Compliant	Action
Access Database Service 2010	Stopped	✓ Yes	
Access Services	Stopped	✓ Yes	
App Management Service	Stopped	✓ Yes	
Business Data Connectivity Service	Stopped	✓ Yes	
Central Administration	Started		Stop
Claims to Windows Token Service	Stopped	✓ Yes	
Document Conversions Launcher Service	Stopped	✓ Yes	
Document Conversions Load Balancer Service	Stopped	✓ Yes	
Lotus Notes Connector	Stopped	✓ Yes	
Machine Translation Service	Stopped	✓ Yes	
Managed Metadata Web Service	Stopped	✓ Yes	

Figure 5.25 – Services on Server

This shows that we are currently only running the **Central Administration** site. This is because we have only created the farm and the Central Administration site. Because this is the only service that is running on this server, we can start configuring our farm and adding more services to our first server.

Registering service accounts

Before we can create service applications or web applications, we need to register service accounts for our farm so that these accounts can configure these services. This is really important because if these accounts are not available, you will not be able to configure separation of duties between service accounts. The only account that will be available will be the farm account since it was registered during the farm creation process.

To do this via SharePoint's Central Administration site, perform the following steps:

1. Start by opening the **Security** page:

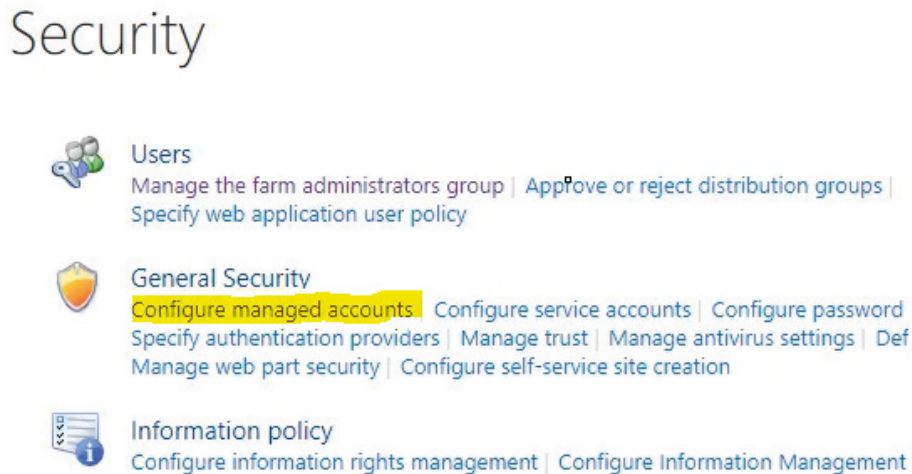


Figure 5.26 – Central Administration – account management

2. Click **Configure managed accounts** underneath **General Security**. Once you have filled in the form that appears, click **OK**:

The screenshot shows the 'Register Managed Account' form. The title 'Register Managed Account' is at the top with an information icon. Below the title is a section titled 'Service account credentials' with a dropdown arrow. It contains two text input fields: 'User name' and 'Password', both of which are filled with yellow text. Below these fields is a checkbox labeled 'Enable automatic password change', which is checked. Under this checkbox, there is a text label 'If password expiry policy is detected, change password' followed by a text input field containing the number '2' and the text 'days before expiry policy is enforced'. Below this is another checkbox labeled 'Start notifying by e-mail', which is unchecked. Under this checkbox is a text input field containing the number '5' and the text 'days before password change'. At the bottom are two radio buttons: 'Weekly' and 'Monthly'. The 'Monthly' radio button is selected.

Figure 5.27 – Register Managed Account page

Add the account to the **User name** area of the form. The account must be in the following format: domain\username. You can enable automatic password changes via SharePoint. I have used this in the past to update passwords for my service accounts and it worked like a charm. The only issue that occurs is when you may need to sign in using that account as part of troubleshooting. So, if you want to know your password for the account, just do this as part of your monthly maintenance process and document this password change if you don't want to use the randomly automated password updates.

3. To do this using PowerShell, use the following commands:

```
$Password = "Ki90@T887"
$Account= "XYZ\WebAppPool"
$pass = convertto-securestring $Password -asplaintext -force
$cred = new-object management.automation.pscredential $Account , $pass
$res = New-SPManagedAccount -Credential $cred
```

Make sure that you include a password that is up to your security standards. Remember that user accounts cannot be more than 20 characters in length; if they are, you will never see them added to the list of registered accounts. Now that we have added our accounts, we can use them in our service application and web application configurations.

Under the **Configurable** drop-down, you can view all the accounts that have been created and registered for use with the service applications you will be creating in this section:

Application Pool

Choose the Application Pool to use for this Service Application. This defines the account and credentials that will be used by this web service.

You can choose an existing application pool or create a new one.

☐ Use existing application pool

App_Manage_Pool

☐ Create new application pool

Application pool name

Select a security account for this application pool

☐ Predefined

Network Service

☒ Configurable

Register new managed account

Figure 5.28 – Adding registered accounts

Creating our services

The following is the list of services we will be creating in this section:

- Word Automation Services
- Visio Services
- Machine Translation Services
- Managed Metadata Services
- Claims to Windows Token Service
- Business Data Connectivity Service
- Secure Store Service

To ensure we do not include any redundant steps, let's explain the process of adding a service application.

You will find yourself going back to the main menu within the Central Administration Service Application menu to create a new service application once you've created one. Perform the following steps to create a service application. We will be using these steps for all our services since most require the same inputs for creation:

1. From the **Central Administration** site, to get to the service application creation area, click on **Application Management**:



Figure 5.29 – Central Administration

2. Under **Application Management**, click on **Manage Service Applications**:

Application Management

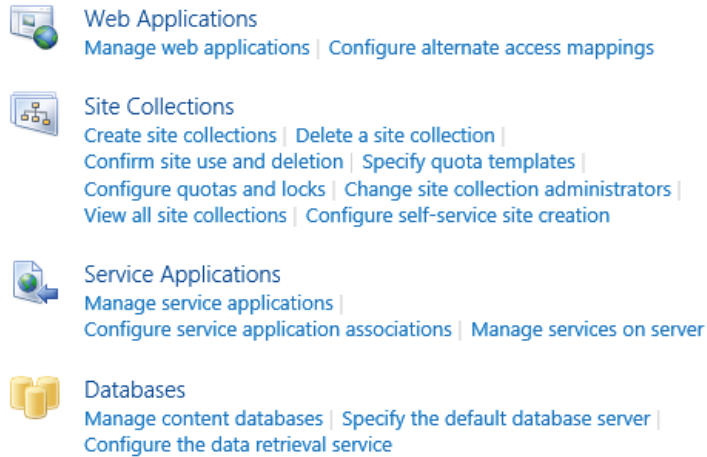


Figure 5.30 – Application Management

3. Upon clicking **Service Applications**, you will see a list of running service applications, as well as various ways to create and manage them within the farm:

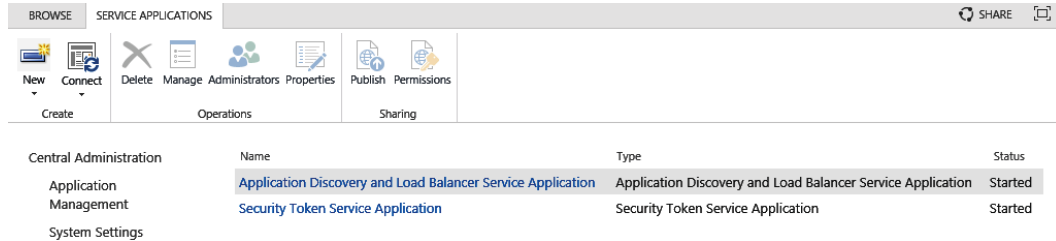


Figure 5.31 – Service Applications

This is the main area you will be working from to create your service applications. This is a redundant step, so please remember how to get to these areas if you are not familiar with the process. You can always come back to this section to refresh your memory.

4. Upon clicking on the **New** button in the top-left corner, you will see a list of service applications that can be created:

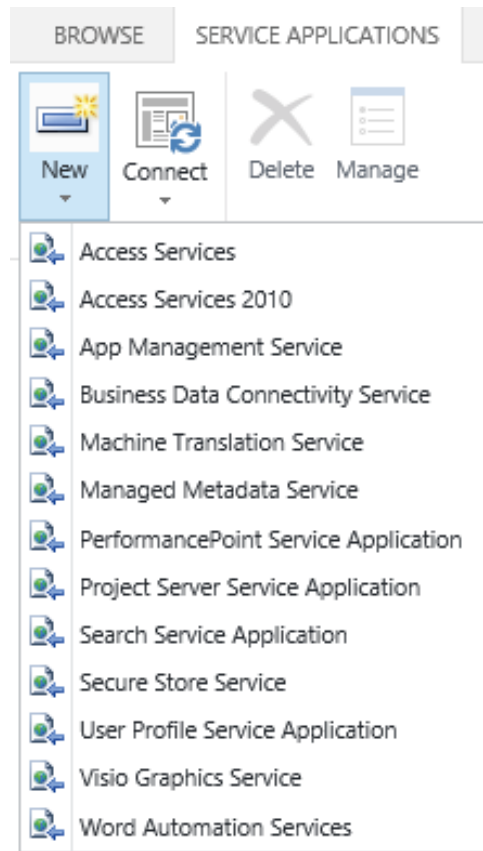


Figure 5.32 – Service Applications – creation selection menu

Next, we will look at Word Automation Services.

Word Automation Services

We will start with our first service: **Word Automation Services**. Word Automation Services is a technology that allows you to provide unattended, server-side conversion for documents that are supported by Microsoft Word. To start creating this service using the GUI, please click on that area within the menu.

Follow these steps to set this up:

1. Create a name for your service. Remember your naming conventions for service applications. Choose a service account that will manage this service and click the checkbox shown in the following screenshot to add this service application to your list of proxies:

Create New Word Automation Services Application ✕

 Specify the name, application pool, and database information for the service application. The settings you specify here can be changed later using the 'Manage' and 'Properties' buttons on the Manage Service Application page. [Help](#)

Name The name for the new service application.	Name YZ Word Automation Service
Application Pool Choose the Application Pool to use for this Service Application. This defines the account and credentials that will be used by this web service. You can choose an existing application pool or create a new one.	☒ Use existing application pool XYZServices_AppPool ▼ ☐ Create new application pool Application pool name Select a security account for this application pool XYZINC\spctwts ▼ Register new managed account
Add to Default Proxy List Specify if this service application's proxy should be added to the default proxy list.	☒ Add this service application's proxy to the farm's default proxy list.

Figure 5.33 – Create New Word Automation Services Application page

2. Provide the SQL Server name for the database server, which is our alias name, and the database name for the database that will be hosting the data for this service:

Create New Word Automation Services Application ✕

 Specify the name, application pool, and database information for the service application. The settings you specify here can be changed later using the 'Manage' and 'Properties' buttons on the Manage Service Application page. [Help](#)

Database

Use of the default database server and database name is recommended for most cases. Refer to the administrator's guide for advanced scenarios where specifying database information is required.

Use of Windows authentication is strongly recommended. To use SQL authentication, specify the credentials which will be used to connect to the database.

Database Server

Database Name

☒ Windows authentication (recommended)
☐ SQL authentication

Account

Password

Finish

Cancel

Figure 5.34 – Providing a name for our SQL Server

Please provide the **Database Server** name, which is your alias name, and a **Database Name**. You should use a naming convention that supports the service being documented.

Important Note

Naming conventions are very important. Remember that service applications can be related to the overall company, a department, or custom segments of your company. Name it so that you understand who this service belongs to. This also stands when you're naming databases. If the service and/or database is just going to be used overall for the farm, then name it similar to how I named it so that it supports a global aspect. Any specifics in your naming are welcome, but try not to make the database names too long.

We can also use PowerShell to create the service. To open the SharePoint Management Shell, type in SharePoint on your desktop; you will see it listed as an application. When using the SharePoint Management Shell, always click **Run As Administrator**. Right-click the application link and choose **Run As Administrator**:

```
Add-psnapin Microsoft.SharePoint.PowerShell
```

```
New-SPServiceApplicationPool -Name "Word Conversion  
Services Application Pool" -Account <<service application  
account>>
```

```
Get-SPServiceApplicationPool -Identity <<application pool  
name>> | New-SPWordConversionServiceApplication -Name "Word  
Conversion Services"
```

Now, we can create our next application service: **Visio Graphics Service**.

Visio Graphics Services

This service enables you to load, display, and interact programmatically with Microsoft Visio documents on your SharePoint Server. Provide a name for your service and use the service's application pool or create your own, depending on your requirements. Check the checkbox shown in the following screenshot and click **OK**:

New Visio Graphics Service Application

Help

Visio Graphics Service Application Name
XYZ Visio Graphics Service

Visio Graphics Service Application Name

Application Pool
Choose the Application Pool to use for this Service Application. This defines the account and credentials that will be used by this web service.

☒ Use existing application pool
XYZServices_AppPool

☐ Create new application pool
Application pool name

You can choose an existing application pool or create a new one.

Select a security account for this application pool
XYZINC\spcwtws
[Register new managed account](#)

Create a Visio Graphics Service Application Proxy
☒ Create a Visio Graphics Service Application Proxy and add it to the default proxy group

OK Cancel

Figure 5.35 – Visio Graphics Service Application

You can also create this service using PowerShell:

```
New-SPVisioServiceApplication -Identity 'Visio Graphics Service Application' -ApplicationPool 'SharePoint Web Services Default' -CreateDefaultProxy
```

Note

The SharePoint Web Services Default Application Pool is an application pool that's created by SharePoint when the application is installed. This can be used to support new services you create, though you can create another service application pool to support these services. Please be aware that the Farm Account will run this application pool by default.

There are best practices you need to follow since we do not want to have an overwhelming amount of application pools. In some cases, you can use separate application pools to give individuality to the service you are creating. This would use a different service account other than the farm account to limit access to the service account being compromised. If you can, limit the pools to 10 as that is a best practice.

I have seen some bad configurations in my career. I had one local government client call me to come onsite to take a look at their configuration. The servers they had for the web tier were running out of memory. The client had 34 path-based web applications running with different applications pools and service accounts. This was the shortest call I had while working at Microsoft; I resolved the issue by adding memory and CPU to the servers. This is not a great configuration, but it worked. They could have used Host Named Site Collections but chose not to do so. The moral of the story is that best practices are there for a reason. Choose your path and understand the consequences that may result from your actions.

Business Connectivity Services

Now, will create our next service: **Business Connectivity Services**. Business Connectivity Services is used to help us connect to data that may be outside of SharePoint. This allows us to connect to SQL databases that are hosted on other servers, as well as on the cloud. To create a Business Connectivity Service, add a name for your service application. Enter your database's alias name as the **Database Server** name and provide a name for your service database, under **Database Name**. Then, click **OK**:

Create New Business Data Connectivity Service Application

Name

Enter the name of the Business Data Connectivity Service Application. The name entered here will be used in the list of Service Applications displayed in the Manage Service Applications page.

Service Application Name

Database

Use of the default database server and database name is recommended for most cases. Refer to the administrator's guide for advanced scenarios where specifying database information is required.

Use of Windows authentication is strongly recommended. To use SQL authentication, specify the credentials which will be used to connect to the database.

Database Server

Database Name

Database authentication

☒ Windows authentication (recommended)

☐ SQL authentication

Account

Password

Failover Server

You can choose to associate a database with a specific failover server that is used in conjunction with SQL Server database mirroring.

Failover Database Server

Figure 5.36 – Create New Business Data Connectivity Service Application

Important Note

In my examples, I placed the name of my main service at the end of all the names of my service databases. I did this to categorize them in the list of databases in SQL Server. This way, all my services databases will be in one area and all my content databases will be in another.

To create the service using PowerShell, use the following commands:

```
New-SPBusinessDataCatalogServiceApplication -ApplicationPool
"SharePoint Web Services Default" -DatabaseName "NewBdcDB"
-DatabaseServer "YourDomain\SharePoint" -Name "YourServiceApp"
```

Now, we will create our next service: **Machine Translation Services**.

Machine Translation Services

The Machine Translation Service is used to provide automatic machine translation of files and sites. This service is provided on a cloud hosted machine by Microsoft and powers Office, Lync, Yammer, and Bing's translation features.

If you need this service application and are willing to make sure your users understand how this service works, please add a name for the service application. At this point, you can either create a new services application pool or use the same existing services application pool. Click **OK** once you have completed the form:

Create New Machine Translation Service Application

Name
The name for the new service application.
Name: XYZ Machine Translation Service

Application Pool
Choose the Application Pool to use for this Service Application. This defines the account and credentials that will be used by this web service.
You can choose an existing application pool or create a new one.
☐ Use existing application pool
SecurityTokenServiceApplicationPool
☒ Create new application pool
Application pool name:
Select a security account for this application pool
XYZINC\spservice
[Register new managed account](#)

Add to Default Proxy List
Specify if this service application's proxy should be added to the default proxy list.
☒ Add this service application's proxy to the farm's default proxy list.

Database
Use of the default database server and database name is recommended for most cases. Refer to the administrator's guide for
Database Server: SPSQLConnect
Database Name: 2019_MachineTrans_Service

Figure 5.37 – Create New Machine Translation Service Application

You also have the option to create this service application using PowerShell:

```
New-SPTranslationServiceApplication -Name  
TranslationService -ApplicationPool 'SharePoint Web  
Services Default' -DatabaseServer Server1 -DatabaseName  
TranslationServiceDatabase
```

Now, we will create the Managed Metadata Service.

Managed Metadata Services

This service is used to define metadata that can be used to tag information within your content for search and navigation purposes. Follow these steps to create the service:

1. Add a name for the Managed Metadata Service application, along with the SQL alias and **Database Name** you need for the service application:

Create New Managed Metadata Service ×

 Specify the name, databases, application pool and content settings for this Managed Metadata Service. [Help](#)

Name

Database Server

Database Name

Database authentication
☒ Windows authentication (recommended)
☐ SQL authentication

Account

Password

Figure 5.38 – Create New Managed Metadata Service

2. You can also use the same services application pool or create a new one for this service application. Click **OK** to create the service application:

Create New Managed Metadata Service x

 Specify the name, databases, application pool and content settings for this Managed Metadata Service. [Help](#)

Failover Server

Application Pool
Choose the Application Pool to use for this Service Application. This defines the account and credentials that will be used by this web service.

You can choose an existing application pool or create a new one.

Enter the URL of the site collection (Content Type hub) from which this service application will consume content types.

Failover Database Server

☒ Use existing application pool

☐ Create new application pool

Application pool name

Select a security account for this application pool



[Register new managed account](#)

Content Type hub

☒ Report syndication import errors from Site Collections using this service application.

☒ Add this service application to the farm's default list.

Figure 5.39 – Application pool options

If you plan on having a dedicated site collection for the Content Type Hub, which distributes content types to web applications, you can set that URL here. However, since we do not have a web application yet, we will come back to this later and set it using PowerShell. You can also add this service application to the farm's default list if this is a default service for the farm.

To create this service using PowerShell, use the following code:

```
New-SPMetadataServiceApplication -Name "MetadataServiceAppName"
-ApplicationPool "AppPoolName" -DatabaseName "MetadataDBName"
```

To create the Managed Metadata Service with a Content Type Hub, use the following code:

```
New-SPMetadataServiceApplication -Name "MetadataServiceAppName"  
-ApplicationPool "AppPoolName" -DatabaseName "MetadataDBName"  
-HubUri "https://sitename" -SyndicationErrorReportEnabled
```

Claims to Windows Token Service

SharePoint Server 2019 – in fact, all versions of the product – require Active Directory authentication. This authentication is required for users to access SharePoint resources and apps, and is also used so allow servers to access on-premises SharePoint resources in a farm. If a server has a trust relationship with other servers in the SharePoint farm, they will be able to access secured resources on another SharePoint server in the farm. This is called server-to-server authentication and is done using the STS and OAuth server-to-server protocol.

When outside data sources or application connectivity is needed outside the SharePoint farm, such as with SQL Reporting Services, we need the **Claims to Windows Token Service (C2WTS)** running as it is a required service in SharePoint for connectivity to occur between two applications. This service should run under its own domain identity and should have the following rights assigned:

- Act as part of the operating system
- Impersonate a client after authentication
- Log on as a service

There are other authentication methods available, such as Kerberos and SAML, that we will explain later in this book.

Starting this service can be done using a simple PowerShell command that can be used to start any service in SharePoint. We can use this command for all the services we have created once the service application has been created. Search and User Profiles have different processes that need to be followed.

This service, C2WTS, does not require us to create a service application. We only need to start the service. Open SharePoint Management Shell to run PowerShell commands:

```
Start-SPServiceInstance -Identity <ServiceGUID>
```

To stop a service, use the following command:

```
Stop-SPServiceInstance -Identity <ServiceGUID>
```

When you wish to find the ServiceGUID for the service you want to start, run the following command:

```
Get-SPServiceInstance
```

Now, we will create another service: Secure Store Service.

Secure Store Service

The Secure Store Service application provides a claims-aware authorization service. It also provides an encrypted database for storing credentials that is usually kept on another SQL Server for security. This service provides authorization to applications that are running within the SharePoint Server.

To create this service using PowerShell, use the following commands:

```
New-SPSecureStoreServiceApplication -ApplicationPool  
'SharePoint Web Services Default' -AuditingEnabled:$false  
-DatabaseName 'Secure Store' -Name 'Secure Store Service  
Application'
```

Make sure that you only create the services you need. You do not have to follow my creation plan in this book. Creating services you don't need is not a good practice. Finalize the services you think you will need and create them.

Once these service applications have been added, it does not hurt to run PSconfig to solidify the farm and make sure all configurations are working as they should. You can do this using the Configuration Wizard, which can be found by typing in SharePoint on your desktop or by using PowerShell and running the following script:

```
PSConfig.exe -cmd upgrade -inplace b2b
```

Once you've done this, shut down/restart or reboot your servers, starting with SharePoint first and then SQL. Make sure SQL is running first before the SharePoint server so that you don't get any connectivity errors. Once completed, we can start adding servers to the farm. Always check your event logs once you've rebooted to see if there are any new errors.

Important Note

Running `PSConfig.exe` with no parameters does not upgrade or do any good to the farm's content. Without any parameters running, this command is useless. Make sure that you add parameters to apply upgrades when running a full upgrade command, not just the initial executable. When you add content to the farm, you will add more parameters to upgrade content and features.

SharePoint MinRole resources

We talked about MinRoles and their importance in *Chapter 2, Planning and Architecture*. Assigning MinRoles at this point in our configuration is essential as we have two big service applications we left out previously: User Profile Services and Search Services. I have different reasons for leaving these for last, all of which will be explained in *Chapter 6, Finalizing the Farm – Going Live*, but to summarize, User Profiles require a server resource in order to run efficiently, as do Search Services. In our configuration, Search requires two servers for redundancy. We can only provide these resources by adding the servers to the farm, which we will do now. Distributed caches will come into play now as well.

Once you have installed SharePoint on all the servers you've created, as we stated in *Chapter 4, Installation Concepts*, we need to start adding them to the farm. Various prerequisites must be met on all the servers, including performing updates that relate to the version the farm is running at currently. All server resources should have similar/the same configurations as other SharePoint servers, including CPU, RAM, and drive configurations (drive letters must be the same; configuring server resources by tier or MinRole is a best practice).

There are two different ways to add a new server to our farm:

- The first is to use the **Configuration Wizard** window, as shown in the following screenshot:

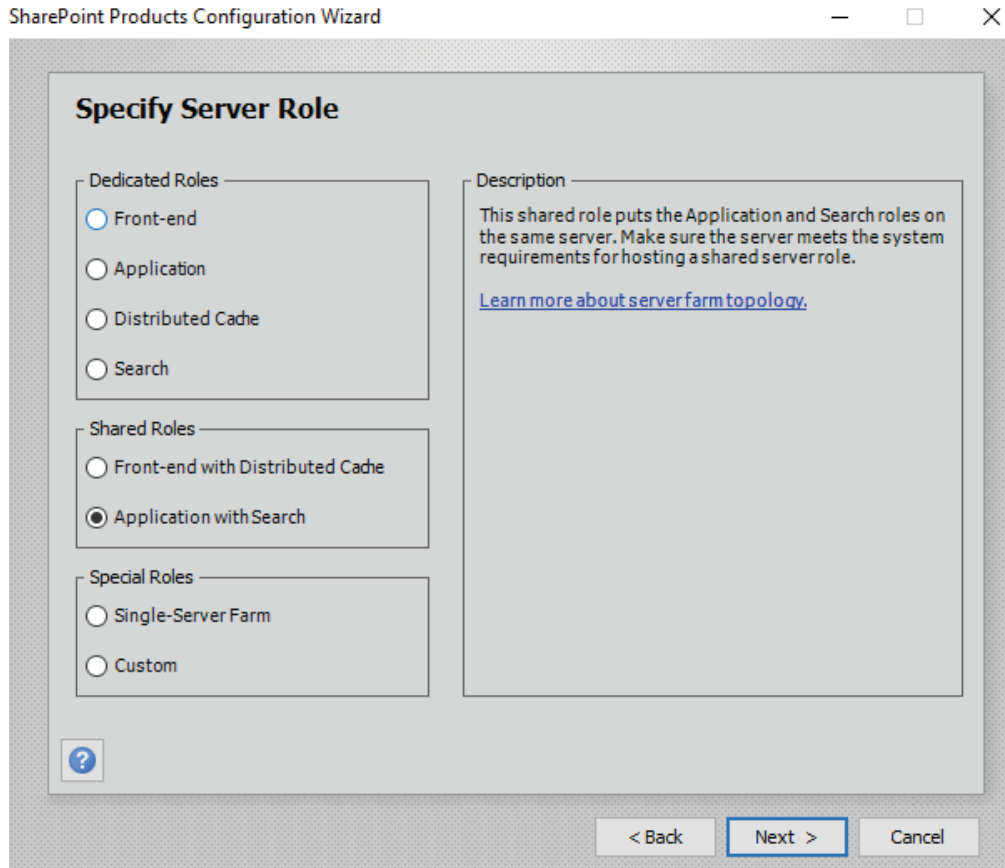


Figure 5.40 – Specify Server Role

- The other is to use PowerShell and add the servers using a stripped-down version of our farm configuration script, as shown in the following example:

```
Add-PSSnapin "Microsoft.SharePoint.PowerShell"
#Configuration Settings
$DatabaseServer = "SQL Alias Name"
$ConfigDatabase = "Farm_Config"
$Passphrase = "57J7902KK9Srw$#!#LiPQ"
$FarmAccountName = "Montego\SP_Farm"
$ServerRole="Application"
```

```
#"Custom", "WebFrontEnd", "Application", "DistributedCache",  
"SingleServerFarm", "Search", "ApplicationWithSearch",  
"WebFrontEndWithDistributedCache"  
  
Connect-SPConfigurationDatabase -DatabaseServer  
$DBServer -DatabaseName $DBName -PassPhrase $Passphrase  
-LocalServerRole $ServerRole  
  
Write-Host "Installing SharePoint Resources..."  
Initialize-SPResourceSecurity  
  
Write-Host "Installing Farm Services ..."  
Install-SPService  
  
Write-Host "Installing SharePoint Features..."  
Install-SPFeature -AllExistingFeatures  
  
Write-Host "Installing Help..."  
Install-SPHelpCollection -All  
  
Write-Host "Installing Application Content..."  
Install-SPApplicationContent  
  
Write-Host "Joined the Server to Farm Successfully!"
```

Always remember to update the parameters of this script, as well as the Minrole or Server Role in your script, to make sure you choose the right server roles for your farm. In my farm, I will be adding the following roles:

- Two Application/Search Servers
- Two Web FrontEnd Servers with the Distributed Cache service

Once you've run the script and/or added the servers to the farm using either method, you will see the servers in the **System Settings** area of the **Central Administration** site, under **Servers in the Farm**.

Understanding the Distributed Cache service

The Distributed Cache service is used to improve performance by managing objects and data across MinRole configured servers, as well as servers included in your farm. From past engagements where I've reviewed a farm, I've seen that this service was either not set correctly or was non-existent because it had crashed. In one case, a site was down for many months due to this service and Microsoft Updates failing. It is a very important service, so you cannot leave this out when monitoring or planning a maintenance window that supports updates and/or changing the configuration of the service.

The Distributed Cache service is used to maintain a large amount of information on the server you have chosen to provide these services to in your farm. From a configuration standpoint, these servers can be standalone or used on a WFE tier server, where users interface with the farm at the site level. This service ensures that the information that is gathered for the services is readily available and is provided for the following services running in your farm:

- Authentication
- Newsfeeds, micro blogging, and conversations
- OneNote client access
- Security trimming (Search)
- Page load performance

This service provides caching functionalities that allow users to quickly retrieve data without any dependency on the database. All this information is stored in memory on the servers or MinRoles you have deemed Distributed Cache servers. Distributed Cache spans across these servers as a cache cluster so that each host can save data without duplicating or copying data from other servers running the service.

This service is very important, and in some cases, I have seen where this service was not recoverable. You want to be very careful when working with this service and monitor it as much as possible. Do not administer your AppFabric Caching Service from the services console. It is recommended that you leave this service as-is from your initial configuration. I have seen farms having to be rebuilt due to this service and its parameters being changed.

To check your Distributed Cache, run the following command using PowerShell:

```
Get-CacheHost
```

At the time of installation, 5% of the total physical memory will be assigned to the Distributed Cache service. This is known as the cache's size and can be altered if needed. Since we are setting up a farm, we must have at least one cache host running in the farm. If you have two or more servers that you want to run this service, just know that the size of each cache host is 5% of your physical memory. The maximum size you can make your cache is 16 GB per cache host, so you want to make sure you set aside memory for this service. You should have thought about this when you were planning. We also want to make sure we are aware that we can only have 16 servers running the Distributed Cache service in a farm.

We will learn more about this service and how to make our servers perform well in *Chapter 9, Managing Performance and Troubleshooting*.

Summary

This chapter was the meat of the installation process for SharePoint. Although there is more to come, this chapter laid the foundation for the farm. If we didn't cover these areas, we would not have a base installation to move forward with and, as pertaining to the server resources, have a complete server infrastructure that supports a SharePoint and SQL Server environment.

Be mindful of your settings when you're configuring the performance of SQL Server, especially the MAXDOP settings. If they are changed, the SharePoint environment will not run correctly and you will see performance hits on your SQL servers. This is because SharePoint is built for MAXDOP to be set to 1. Also, building redundancy into your SQL Server platform is also key to supporting the environment. As we mentioned previously, SQL is the key to the data that feeds SharePoint from a configuration, service, and content point of view. Without a fully performant SQL Server, great performance will not exist in your environment.

Make sure that you add servers as needed that support the SharePoint infrastructure that's required for your environment. Separating services as needed and adding user web frontends to support your user community is key to building a farm that can support many users and services. Scaling out your farm is easy to do, and there are many ways to isolate and combine traffic for all your services and user traffic.

We also learned that MinRoles are the key to this separation and service compliance. Never add a server where you do not know what the resource is being used for. If you use a custom MinRole, always make sure to configure it so that it only does what you need it to do and uses the resources it has to only run the services it needs to run. The reason we use MinRoles is so that we can control where services are processed and keep our resources free from running unnecessary processes.

As you can see, paying attention to small details and documenting your configuration is key to updating your farm. It also allows you to ensure you have covered all your requirements, which is the key to success. Configuration management plays a part in all this because you want to make sure the servers match how you want the service to perform. Again, SQL is a big part of SharePoint, and we cannot run SharePoint without it. However, if it's configured incorrectly, we will see performance issues. Follow the guidelines and best practices at hand to make sure you are building the best farm possible. Although this is a lot of work to document, it will pay off in the end.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. Why should we separate application pools for different services within our configuration?
2. Antivirus exclusions don't need to be completed before installation. True or False?
3. Which service application is optional to use a separate database server as a best practice?
4. What setting is required on SQL Server to install SharePoint? What is the setting for that configuration?
5. When setting up Blocked File Types, I can set these file types per site collection. True or False?
6. If running `psconfig`, do I need to run the command using extended parameters? If so, when? Why?

6

Finalizing the Farm – Going Live

Finalizing the farm to "go live" is the last step of the process of supporting the release of your new farm. Within this book, you will find two chapters about the "go live" aspects of your implementation. This is due to the amount of instruction needed to prepare you for your "go live" date. There are a few steps that we still need to complete related to installation, the configuration of services, and overall configuration, which we will cover in this chapter; but what you will also see in this chapter is that there are many areas that we still need to configure to complete the core system.

You will see, while dealing with those lingering configurations, that migration is not the last thing we need to do. There are other areas of preparedness that need to be addressed, as is the case with the setup of development and testing environments. We need to handle any custom configurations that may have been missed, out-of-the-box workflows and custom workflows, backup and restore solution integration, and any operating areas that we need to check, update, and pass on to others who will support the new farm and overall environment.

We will also talk a little about stress testing the environment and the overall testing of the new sites, as well as covering other integrations that need to be checked and installed to support sites as they were supported in the older environment (or schedule them for deployment in our new environment).

The checklist is vast, and we need to make sure that we are bringing a solid environment to the company before release. This chapter will follow that checklist and get you prepared for the release of your new SharePoint farm!

The following topics will be covered in this chapter:

- Finalizing services configuration
- Web application configuration
- Web application settings
- Site collection creation
- Site collection configuration and settings
- Cache service accounts

Technical requirements

To follow along with this chapter, the following requirements must be met:

- 3-5 years of SharePoint experience
- 3-5 years of project management experience

You can find the code files for this chapter on GitHub at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Finalizing loose ends

Did we forget something? I am sure we did. That's why I created this chapter to make sure we go back and retrace our steps and find things that may not have been communicated or documented. We want to make sure at this point that we have accounted for everything in our old environment, which includes services and content. This includes everything we noted in our planning and assessments. The last thing you want is a failed SharePoint farm implementation.

These next two chapters were created to finalize the configuration and make sure that we check all the loose ends to finalize our farm. There are a couple of areas that were left out of our service configuration chapter that we need to expand on, as well as web applications, site collections, and general settings for those areas, which we will get into in this chapter.

Here, as a precaution, it's a good idea to go back and assess your users and departments to make sure you have accounted for all developed solutions, out-of-the-box solutions, workflows, identified retired web parts, and anything that could be an area of concern for functionality and could be missed during this change. I can't stress this enough. The more you miss, the more you will pay for it after users start to work on the new farm.

You need to make sure you know what these users are doing in their site collections and sites. Don't sleep until you get all the answers. At the end of the day, this is what makes you, your department, and SharePoint look bad when you don't migrate everything or miss a functionality that users have been using for years and all of a sudden it's gone. If that functionality has changed, make sure you let the department know and give them a new way to make it work in SharePoint Server 2019.

Believe me, I have been caught with my pants down on a couple of migration projects. One time, there was a tool that I used, and I will not mention the name of this tool, but it malfunctioned as it was not adhering to the migration parameters I had chosen. If I chose to move only the top-level site and not subsites, it would just move all sites anyway. This actually made my contract go over hours because I had to go back and delete all the subsites that were not on the list to move. We will talk more about tools later in this chapter, and I will give my opinions and recommendations on tools and how they can play into your migration and help in other ways to support your infrastructure.

Another situation I was in a few years ago was not having got enough information from users and admins. After doing the migration and moving over to the new farm, there were two critical components missing from the new farm. One was a script used for identity management that worked with the User Profile service to clean up those users no longer working in the company, and another was a custom solution that was developed for a site but was not identified during the migration to the new farm. This caused a lot of problems during the post-implementation as some functionality was missing, and it was very stressful.

So, please be careful: your career and reputation can be shattered when you are not attentive to areas that make a difference in a successful migration. Everyone remembers the bad things, and even if it is one little thing, it will outweigh the good things.

Let's look at some things to remember during the final actions before releasing the farm to the community:

- Workflows keep items locked in lists and libraries if it's in progress on the source site.
- Migration tools will not move locked items or custom solutions.

- Release items by having the department finalize the workflow process or stop the workflow on the item.
- Make a list of those items in progress so the department can restart the workflow in the new environment.
- Workflows and solutions may have to be recreated, especially those coming from 2007 and 2010.
- Workflows and solutions created in Visual Studio from earlier versions will have to be updated to support SharePoint 2019's code structure.
- The workflow history does not migrate with the content database or migration tool – If needed, go to the workflow history list (For example, <http://sharepoint/mysite/lists/Workflow%20History/AllItems.aspx>) and make copies of the lists for your records and for the department. You can slice and dice with columns to get information sorted for printing or saving.
- Remember that the workflow history can be captured as part of the default list or a new history list and can be associated with the workflow.
- Make sure to check the settings of lists moved with tools, as all the required settings for advanced and versioning are not set. This can cause some issues with approval processes in the task list and in the list itself.
- Check your old servers for any PowerShell or custom code used to do any server-side functionality, such as backups, or as in my situation, user profile cleanup.
- Check the **Global Assembly Cache (GAC)** on the old server to make sure there are no custom solutions hiding there that do not show up in the farm solutions list.

There are other areas you can check that might not be included in my list of last-minute checks, but the best thing to do is communicate. Double-check with your admins and site collection admins before making any final migrations. We will talk about testing in this chapter, as well as the pre-migration tasks, test migrations, and final migrations that we need to implement. I will show you what these tasks are all about and how they are used to finalize the movement of content.

Search and the User Profile service

As you know, we have not installed Search or the User Profile service, and the reason is that we need to make sure we have servers added to the farm to support these two services. So, in *Chapter 5, Farm and Services Configuration*, we added servers to the farm, and these servers were created as MinRole services in the farm for the services we are about to deploy. We will add and distribute services for these two missing services across the server resources we added. These are the last two service creations and I saved them for last for a reason. These two services, although they have not changed much in any version of SharePoint, are the most involved in terms of configuration and should be the services that you configure last.

Search service creation

When implementing Search, we need to think about the availability of the service as well as the resources we must provide for services within the farm. As stated in our planning, we plan in this environment to have a redundant Search service running on two servers within the farm using a Search MinRole. This gives the service a redundant footprint in the farm and keeps the service up and running in case of the failure of one of the servers.

There could be situations where security comes into play, where you may need two Search service applications. This would separate the indexes and instead of relying on security trimming, you'd rely on a totally different index, service account, and application pool to separate the content from one web application to another. In our configuration, I really want to go through how to create a redundant Search application because this seems to be more of an issue in the field.

To get started with this implementation, we will need to use PowerShell, and as always, we right-click on the PowerShell icon to open and make sure to run as administrator. We also want to make sure our servers are in place to support the configuration for these services to run redundantly. As you can see in the following screenshot, both servers are available and ready to go:



SP2019-APP1	Running	0%
SP2019-APP2	Running	0%

Figure 6.1 – Search app servers

Implementing the Search service with redundancy again cannot be done within the GUI in **Central Administration**. There are also other restrictions in the GUI that will come up in the configuration, such as database names being grayed out for where you cannot update the names. If you are shooting for full naming and custom database names for all service databases, you will have to create this service application using PowerShell. So, let's open up the SharePoint 2019 shell command line and run the following script from a file location on our primary Search server. The script is shown here and is available on the GitHub site for this book:

Note

Download the script and instructions on the GitHub link at the top of the chapter. Please make sure to set the parameters in the script to fit your server names, index locations, and any other areas you need to customize for your environment.

Search successfully installed:

Server	SharePoint Products Installed	Role	Compliant	Services Running	Status	Remove Server
SP2019-APP1	Microsoft SharePoint Server 2019	Custom		Business Data Connectivity Service Central Administration Distributed Cache Machine Translation Service Managed Metadata Web Service Microsoft SharePoint Foundation Incoming E-Mail Microsoft SharePoint Foundation Web Application Microsoft SharePoint Foundation Workflow Timer Service Search Host Controller Service Search Query and Site Settings Service Secure Store Service SharePoint Server Search Word Automation Services	No Action Required	Remove Server
SP2019-APP2	Microsoft SharePoint Server 2019	Application with Search	✔ Yes	Business Data Connectivity Service Machine Translation Service Managed Metadata Web Service Microsoft SharePoint Foundation Incoming E-Mail Microsoft SharePoint Foundation Web Application Microsoft SharePoint Foundation Workflow Timer Service Search Host Controller Service Search Query and Site Settings Service Secure Store Service SharePoint Server Search User Profile Service Word Automation Services	No Action Required	Remove Server

Figure 6.2 – Confirmation of Search being successfully installed

We have successfully installed the Search service! Once you have migrated your content or have your farm stabilized, start your Search crawl to start gathering content to present in the results. You can use continuous crawling, which will keep crawling content. You can also set a schedule for full or incremental crawls, which is ideal for some scenarios.

Search is configured – what now?

There are many things to know about the Search service, and we will get into some detail on Search later in the book from a user perspective, but at the server level, there are some best practices and things to understand about Search.

One of the key things to remember is that users use Search to find information. So, content must be crawled by connecting to content sources to crawl for the information to come up in the search results. The index you create is what the users will search against, so timing is everything, which is why there are a couple of ways to create crawling schedules. You can use continuous crawling or provide a schedule for full or incremental crawls.

Most companies I have worked for have used continuous crawling as their way to get information in the index, but this doesn't mean that the other crawling types are not useful. A full crawl is still useful because it processes and indexes all the items in a content source. It doesn't matter whether the previous crawl did that or not. This keeps your index clean and up to date.

Tip

Remember, it's always good to run a full crawl after you migrate content from another farm or source so that the information is indexed.

The incremental crawl only crawls items that have been newly created or modified since the last crawl. These crawls don't take a lot of time and usually are pretty quick, depending on how much new content has been added. These modifications would include the following updates:

- Content
- Metadata (remember the Managed Metadata service)
- Permissions
- Deletions from the content

The continuous crawl is sort of similar to the incremental crawl. The difference, though, is that the continuous crawl checks the SharePoint change logs about every 15 minutes. If there is an item in the change log, the crawler finds the content and processes the updates to the index. It's good to have a mixture of continuous crawl and incremental crawls, and this is because the continuous crawl does not fix any errors. Please create a schedule to run these as needed, but if you run an incremental every 4 hours, this would help to clean up any errors; use a full crawl as needed.

Users also have tools to make their search results as good as they can be by tagging content. It's best for users to tag their information so that content can be found easily. This leads to relevant search results, and there are tools for users to tune how content is found as well. They can also create silos of results based on content using the Search web part. This can help them to hone in on any content, such as content in a specific site or library, to provide the search results from that specific content only.

SharePoint 2019 Server provides the same modern search experience as Microsoft 365. You will see a big difference, as the search box is placed at the top of the SharePoint site in the header bar. The search experience in SharePoint 2019 is personal. The results for one user will most likely be different than another user's results in this new version of SharePoint. We talk more about it in *Chapter 12, SharePoint Framework*.

One Search consideration to be aware of is that if you actually get close to having 10 million items indexed, you may want to configure your server as I did in this book using cloning. This will help to spread the service over two servers, which will process items faster and bring better performance for your Search service. The Search service may benefit from being assigned as a MinRole service in some environments where you want to isolate the service to server resources for support as well.

Always keep your configuration of Search clean and separate for processing within the farm, along with where the use of those Search components will be located in a cloned configuration. In the Search configuration for my farm, you can see that I have redundancy on my app servers and redundancy on my web frontend servers. My web frontend servers in this configuration provide query processing and index partitions. My index partitions are updated from the application servers that run the crawl, which propagates over the network after every crawl to my web frontend servers. The results from the user queries are compiled on the web frontend from the index, so that the results from the search come back quickly because the user is on that server resource at the time of the search. This is to not have them go over the network to bring back the results. Make sure to make the crawler servers IIS configurations and HOST file understand that the website is local and there is no need to hit a WFE to crawl the website:

Search Application Topology

Server Name	Admin	Crawler	Content Processing	Analytics Processing	Query Processing	Index Partition
					✓	0
	✓	✓	✓	✓		✓
	✓	✓	✓	✓		
					✓	✓

Figure 6.3 – The Search configuration page

Tip

Always configure your crawling server to crawl sites on the local server using the HOST file and not across the network to hit a web frontend to connect to the sites for crawling. The performance for this process will be very slow for crawling. Your users will be affected as well because of the crawl on the sites they use, and the propagation of the index will also be slowed down if the network is not able to push data from server to server quickly. Remember to check your network connections and configure them to be full duplex and not auto-negotiate.

Now that we have covered the Search service, we can work on setting up the User Profile service. User Profile requires that the Search configuration be completed because there are settings within User Profile that refer to a configured Search service.

Configuring the User Profile service

Before we get started with this configuration, we must make sure to determine which server this service will run on. We can use the first server we created in the farm or another if you have another one that is not running the Search service. These two services are some of the heavy-hitters in terms of resource consumption, so we want to make sure that they are separate in our farm configuration. The first thing we want to do is add our farm account to the local server that we plan to run the User Profile service from. Add the account to the local administrator's group on that server.

Important note

Make sure that you added the farm account to the local administrator's group of the server you choose to run this service! This is part of the configuration process, as you will see in the following steps. Make sure of this!

Once this is completed, you can start the following process:

1. Under **Service Applications**, select **Manage service applications**:

Application Management

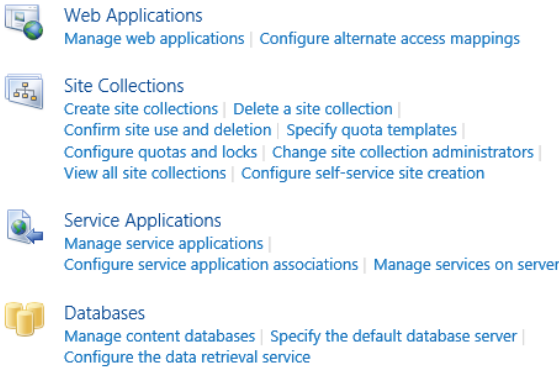


Figure 6.4 – Application Management

2. Click on **New** in **SERVICE APPLICATIONS**:

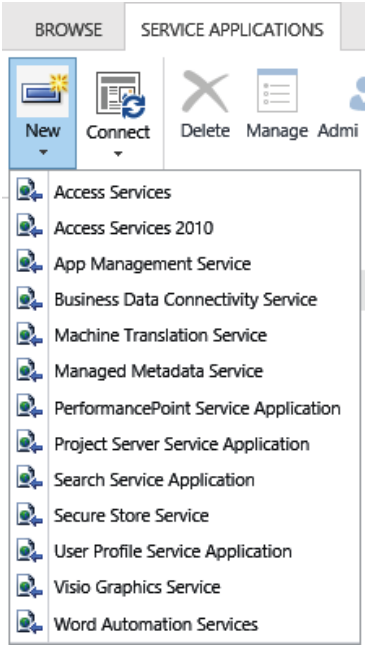


Figure 6.5 – The New button on the SERVICE APPLICATIONS page

Now you could do this the old way in **Central Administration**, but I ran into an error with **User Profile Service Application** using the UI. The error I encountered was a grayed-out screen for the social database. I could not name it or change the SQL Server name in the form. We will create the service using PowerShell; you should get used to using PowerShell. The reason why I added the GUI in this book is to give those who are beginners a way to understand what we are doing. Code sometimes looks foreign and I would rather that all were able to get something out of this book than to just add a bunch of scripts and have people be confused.

3. So, in this case, we will use the following script to create our User Profile service. Please remember to right-click the PowerShell icon and choose to run as administrator.
4. We must create the service application pool first to associate with the User Profile service. Make sure you have added the application pool service account as a managed account before moving forward:

```
$AppPoolAccount = "XYZINC\spuserprofapp"
$AppPoolName = "UPS_App_Pool"

$AppPool = New-SPServiceApplicationPool -Name
$AppPoolName -Account $AppPoolAccount
```

5. Create the service application:

```
Add-PSSnapin Microsoft.SharePoint.PowerShell
$UPSName = "XYZ UPS Service Application"
$ApplicationPool = "UPS_App_Pool"
$ProfileDBName = "XYZ_UPS_Profile_Service"
$SocialDBName = "XYZ_UPS_Social_Service"
$SyncDBName = "XYZ_UPS_Sync_Service"

New-SPProfileServiceApplication -Name $UPSName
-ApplicationPool $ApplicationPool -ProfileDBName
$ProfileDBName -SocialDBName $SocialDBName
-ProfileSyncDBName $SyncDBName
```

6. As you can see in the following screenshot, when we run the PowerShell script, we get a new service application for the User Profile service:

```
PS C:\Windows\system32> C:\Users\spadmin19\Documents\userprofileservice.ps1
```

Name	Type	Id
XYZ UPS Application	User Profile Serv...	9b9c4c22-fb99-4f32-88ff-9f66d9f47eb2

Figure 6.6 – New service application confirmation in PowerShell

7. Then we bind the service application with the proxy for the service:

```
New-SPProfileServiceApplicationProxy -Name 'XYZ UPS Application Proxy' -ServiceApplication "9b9c4c22-fb99-4f32-88ff-9f66d9f47eb2" -DefaultProxyGroup
```

8. As you can see in the following screenshot, we now have a proxy for our User Profile service application:

```
PS C:\Windows\system32> New-SPProfileServiceApplicationProxy -Name 'XYZ UPS Application Proxy' -ServiceApplication "9b9c4c22-fb99-4f32-88ff-9f66d9f47eb2" -DefaultProxyGroup
```

Name	Type	Id
XYZ UPS Applicati...	User Profile Serv...	8fbc0bf3-054e-43dc-ad82-236901dd7352

Figure 6.7 – Proxy for the User Profile service application

Go to the **Manage Services on Server** link and start the service on the server you installed the service on during the PowerShell configuration process.

Now that we have created our User Profile service, we need to bring in individual identities or groups of users from Active Directory. Let's look at how we can do that in the next section.

Configuring your connection to Active Directory

Do you understand your **Active Directory (AD)** structure? Do you know where the users and groups are located that need access to your SharePoint environment? These are questions you need to ask yourself before you go any further. The last thing you want to do is pull identities into the farm that you do not need. Have a conversation with your AD admin and find out the locations of the users and groups needed so that you can choose those areas within the AD structure and bring in only the users and groups that are necessary. They could be in the cloud!

Now that you have that information, let's get started on connecting to AD!

Important Note

Please make sure you have accounted for a replication account to connect to AD, as this service account needs to be used as part of the connection settings in this configuration.

Let's look at the steps:

1. Select **Configure Synchronization Connections** under the **Synchronization** section:

Manage Profile Service: XYZ UPS Application

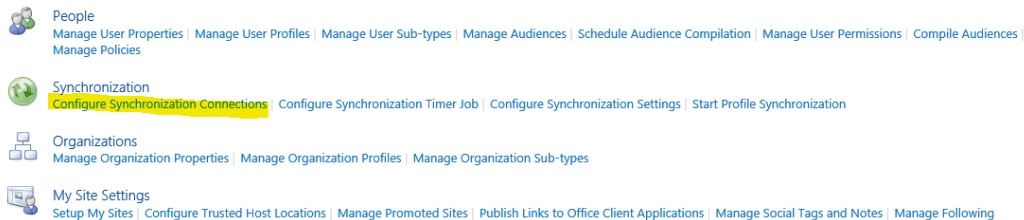


Figure 6.8 – Configure Synchronization Connections

2. Click on **Create New Connection**:

Synchronization Connections

Use this page to manage the list of connections to use to import from Active Directory.

 **Create New Connection**

Name	Type
The query returns nothing.	

Figure 6.9 – Synchronization Connections

3. Fill out the form to update **Connection Settings**:

Add new synchronization connection

Use this page to configure a connection to a directory service server to synchronize users.

* Indicates a required field

Connection Name

Type

Connection Settings

Fully Qualified Domain Name (e.g. contoso.com):

Fully Qualified Domain Name (e.g. contoso.com):

For Active Directory connections to work, this account must have directory sync rights.

Authentication Provider Type:

Authentication Provider Instance:

Account name: *

Example: DOMAIN\user_name

Password: *

Confirm password: *

Port:

☐ Use SSL-secured connection

☐ Filter out disabled users

Filter in LDAP syntax for Active Directory Import.

Containers

Choose which containers you want to be synchronized.

Populate Containers

Figure 6.10 – Adding a new synchronization connection

4. Start the synchronization using **Start Profile Synchronization** as shown in the following figure:

Manage Profile Service: XYZ UPS Application



People

[Manage User Properties](#) | [Manage User Profiles](#) | [Manage User Sub-types](#) | [Manage Audiences](#) | [Schedule Audience Compilation](#) | [Manage User Permissions](#) | [Compile Audiences](#) | [Manage Policies](#)



Synchronization

[Configure Synchronization Connections](#) | [Configure Synchronization Timer Job](#) | [Configure Synchronization Settings](#) | [Start Profile Synchronization](#)



Organizations

[Manage Organization Properties](#) | [Manage Organization Profiles](#) | [Manage Organization Sub-types](#)



My Site Settings

[Setup My Sites](#) | [Configure Trusted Host Locations](#) | [Manage Promoted Sites](#) | [Publish Links to Office Client Applications](#) | [Manage Social Tags and Notes](#) | [Manage Following](#)

Figure 6.11 – Start Profile Synchronization

5. Choose **Start Full Synchronization**:

Start Profile Synchronization

Use this page to start a full or incremental Synchronization.

Start Profile Synchronization

Select Incremental Synchronization to start an incremental synchronization now. Only data that has changed in connected sources and User Profile will be synchronized.

Not recommended: In most case, Incremental sync should be sufficient. Selecting Full Synchronization is time and compute intensive and is not recommended unless absolutely required to reset data store in User Profile.

☐ Start Incremental Synchronization

☒ Start Full Synchronization

OK

Cancel

Figure 6.12 – Start Full Synchronization

We will run a full crawl using the search area of the central admin later when we have created our user web application and/or have migrated some content to a site.

Creating web applications and associations

In this section, we will go over the creation of web applications and how we associate services to those web applications. The need for two web applications is immediate. The two we need to create in this section are for the users and the MySite content, which we will talk about as well. MySite is not a mandatory site but it needs to be in place as part of the farm as it is necessary to user profiles, gathering user hierarchical information for use within workflows (such as an identity for a user's manager), and settings for configuration within the farm for search. If you would like an enterprise search web application, you can also do that as well, but it is not mandatory. The site template for that site collection is **Enterprise Search Center** under **Enterprise**:

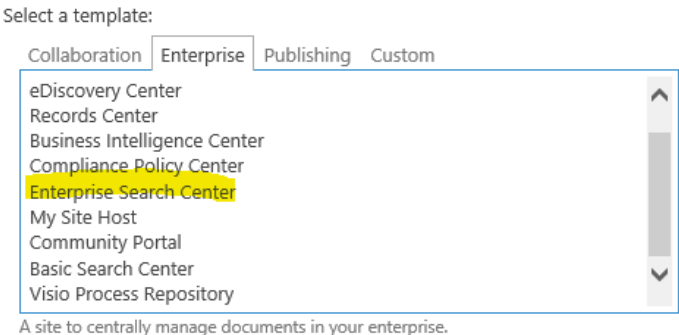


Figure 6.13 – Enterprise Search Center

There have always been special needs for each customer I have worked with, so there could be a need for more web applications. Follow and repeat the following steps to add more web applications as needed. During this process, we will need IP addresses and SSL certificates, which you have to use during the configuration of the site. Please have those ready as these are prerequisites for this section.

The association of services to web applications is something we need to discuss as well as what constitutes a web application that needs a separate service association. We will also look at server and service compliance for how we can keep our servers running efficiently using the MinRole topology we chose to configure our farms with. We will see how server/service compliance works and how it really helps us to manage resources more efficiently.

Web applications

Web applications define how content is accessed from the network in SharePoint through the web browser. If there is no web application, there is no content. So, in this section, we want to focus on how to create web applications and what needs to be brainstormed before you start creating. In a previous section, we did discuss web applications and the reasons for them (in our planning section), but again we need to make sure at this time that we really have thought everything through and also make any changes that necessary due to new developments as well.

When starting to think about web applications, make sure you have done the following:

- Captured all areas of content you would like to categorize on this URL level
- Handled the zoning of the web application and how it will be accessed
- Associated service applications
- Managed the service accounts and app pools that will run this web application
- Handled the isolation and security of the web application on a server resource

When looking at our company and the departments and functional areas we need to support, one of the reasons why we would split content into separate web applications within SharePoint is to secure it. Securing content within a web application, which is the top-level access point, can be an area of concern. Making this our focus for security gives us a clear security break from other app pool service accounts, users, and groups accessing the web application and service associations at this level. The key to this split at this level is to make sure that access is not given to someone by accident.

Keeping content separate also can be done for performance reasons and/or reasons to do with customization. Customized sites with coding bring a different level of processing and support to a web application. This also can be the case with web applications that host a lot of data, such as PowerPivot or Excel data and other reporting data. Such a web application would be more resource-intensive than other web applications with no coding that are used for normal, out-of-the-box functionality.

Another reason for separation would be to separate groups of content and use separate URLs within the company for departments within the organization. For example, we can have a subdomain such as `hr.xyzinc.com` to represent the human resources division and another subdomain of `it.xyzinc.com` to represent the information technology division. This will give a clear separation of sites and content for the company department structure. This type of configuration will make it hard to share information, but I have seen these configurations help in organizing and protecting sensitive information.

To create a web application, follow the steps given here:

1. Go to the **Central Administration** site and click on **Application Management**:



Figure 6.14 – Central Administration

2. Under **Web Applications**, click on **Manage web applications**:

Application Management

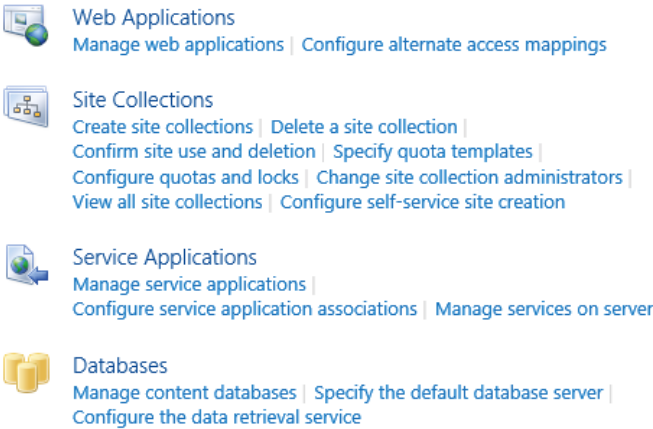


Figure 6.15 – Application Management

3. Click **New** in the top-left corner:

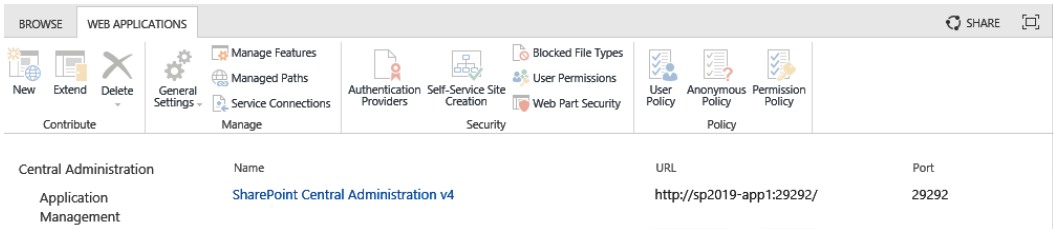


Figure 6.16 – The New button

- Complete the form presented to configure your web application. Name your web application, Port and use a host header if needed:

Create New Web Application

✕

Warning: This page is not encrypted for secure communication. User names, passwords, and any other information will be sent in clear text. For more information, contact your administrator.

IIS Web Site

Choose between using an existing IIS web site or create a new one to serve the Microsoft SharePoint Foundation application.

If you select an existing IIS web site, that web site must exist on all servers in the farm and have the same name, or this action will not succeed.

If you opt to create a new IIS web site, it will be automatically created on all servers in the farm. If an IIS setting that you wish to change is not shown here, you can use this option to create the basic site, then update it using the standard IIS tools.

☐ Use an existing IIS web site

Default Web Site

☒ Create a new IIS web site

Name XYZ Inc Company Web

Port 80

Host Header spweb.xyzinc.local

Path C:\inetpub\wwwroot\wss\VirtualDirectories\80

Security Configuration

If you choose to use Secure Sockets Layer (SSL), you must add the certificate on each server using the IIS administration tools. Until this is done, the web application will be inaccessible from this IIS web site.

Allow Anonymous

☐ Yes

☒ No

Use Secure Sockets Layer (SSL)

☐ Yes

☒ No

Claims Authentication Types

Choose the type of authentication you want to use for this zone.

Negotiate (Kerberos) is the

☒ Enable Windows Authentication

☒ Integrated Windows authentication

NTLM

☐ Basic authentication (credentials are sent in clear text)

Figure 6.17 – Creating a new web application

5. Input the URL and choose a new application pool name. Update the service account you will use for the application pool. Input a **Database Server** name and a database name for the content database supporting the initial creation of the web application:

Create New Web Application

enabled, a URL for redirecting the user to the Sign In page is required.

[Learn about Sign In page redirection URL](#)

Public URL

The public URL is the domain name for all sites that users will access in this SharePoint Web application. This URL domain will be used in all links shown on pages within the web application. By default, it is set to the current servername and port.

<https://go.microsoft.com/fwlink/?LinkId=114854>

Application Pool

Choose the application pool to use for the new web application. This defines the account and credentials that will be used by this service.

You can choose an existing application pool or create a new one.

Database Name and Authentication

Use of the default database server and database name is recommended for most cases. Refer to the administrator's guide for advanced scenarios where specifying database information is required.

Use of Windows authentication is

URL

Zone

Default

☐ Use existing application pool

.NET v2.0 {}

☒ Create new application pool

Application pool name

Select a security account for this application pool

XYZINC\spcwtws

[Register new managed account](#)

Database Server

Database Name

Database authentication

☒ Windows authentication (recommended)

☐ SQL authentication

Figure 6.18 – Inputting the database server name

6. Complete this section using the values given in the following screenshot:

Create New Web Application

Failover Server

You can choose to associate a database with a specific failover server that is used in conjunction with SQL Server database mirroring.

Failover Database Server

Service Application Connections

Choose the service applications that this Web application will be connected to. A Web application can be connected to the default set of service applications or to a custom set of service applications. You can change the set of service applications that a Web application is connected to at any time by using the Configure service application associations page in Central Administration.

Edit the following group of connections: default

Name	Type
☒ XYZ BCS Application	Business Data Connectivity Service Application Proxy
☒ XYZ Machine Translation Service	Machine Translation Service Proxy
☒ XYZ MMS Service Application	Managed Metadata Service Connection
☒ XYZ Secure Store Service Application	Secure Store Service Application Proxy
☒ WSS_UsageApplication	Usage and Health Data Collection Proxy
☒ Connection to XYZ Visio Graphics Service	Visio Graphics Service Application Proxy
☒ XYZ Word Automation Service	Word Automation Services Proxy

Customer Experience Improvement Program

Collect web site analytics about web pages on this web application. Please read the Administration guide before turning this on for web applications available over the public Internet.

Enable Customer Experience Improvement Program

☐ Yes

☒ No

Warning: In order for Customer Experience Improvement Program (CEIP) to collect data, both CEIP and browser CEIP, at the farm level, should be enabled.

OK

Cancel

Figure 6.19 – Web application configuration values

Assigning service applications is a part of the web application. If you have separate service applications, you can create new services and assign them to the appropriate web application using Central Administration.

To create a web application using PowerShell, use the following command:

```
New-SPWebApplication -Name "XYZ Company Web Application"
-Port 80 -HostHeader spweb.xyzinc.local -URL "https://
spweb.xyzinc.local" -ApplicationPool "spweb_App_Pool"
-ApplicationPoolAccount (Get-SPManagedAccount "xyzinc\
websrvact")
```

Configuring host named site collections using PowerShell is very similar as there are few differences in the approach for this type of site hierarchy. The top-level site is a path-based site and the site collections below it are host named sites. You create those using the following PowerShell command:

```
New-SPSite 'http://portal.contoso.com'
-HostHeaderWebApplication (Get-SPWebApplication 'Contoso
Sites') -Name 'Portal' -Description 'Customer root' -OwnerAlias
'contoso\administrator' -language 1033 -Template 'STS#0'
```

There are some other configurations needed within the web application you have created. There are selections of features within the web application and within site collections that need to be set. We look at those web application features in the next section.

When you have finished creating web applications in your environment be sure to look at a load balancing strategy to support redundancy within the Web Tier. We talk about load balancers and those technologies in *Chapter 7, Finalizing the Farm to Go Live - Part II*. Also, make sure to define Site Quotas as part of your web application configurations and the site collection level to keep the size of your site collections in a best practice capacity.

Managing features

There are features that we can activate from Central Administration to turn on features related to the web application. As stated, we can separate services and features based on the need within the web application. For example, let's say video processing is not needed in the MySite web application based on company policy. Using these feature activation settings, I can make sure that that feature is deactivated at the web application level:

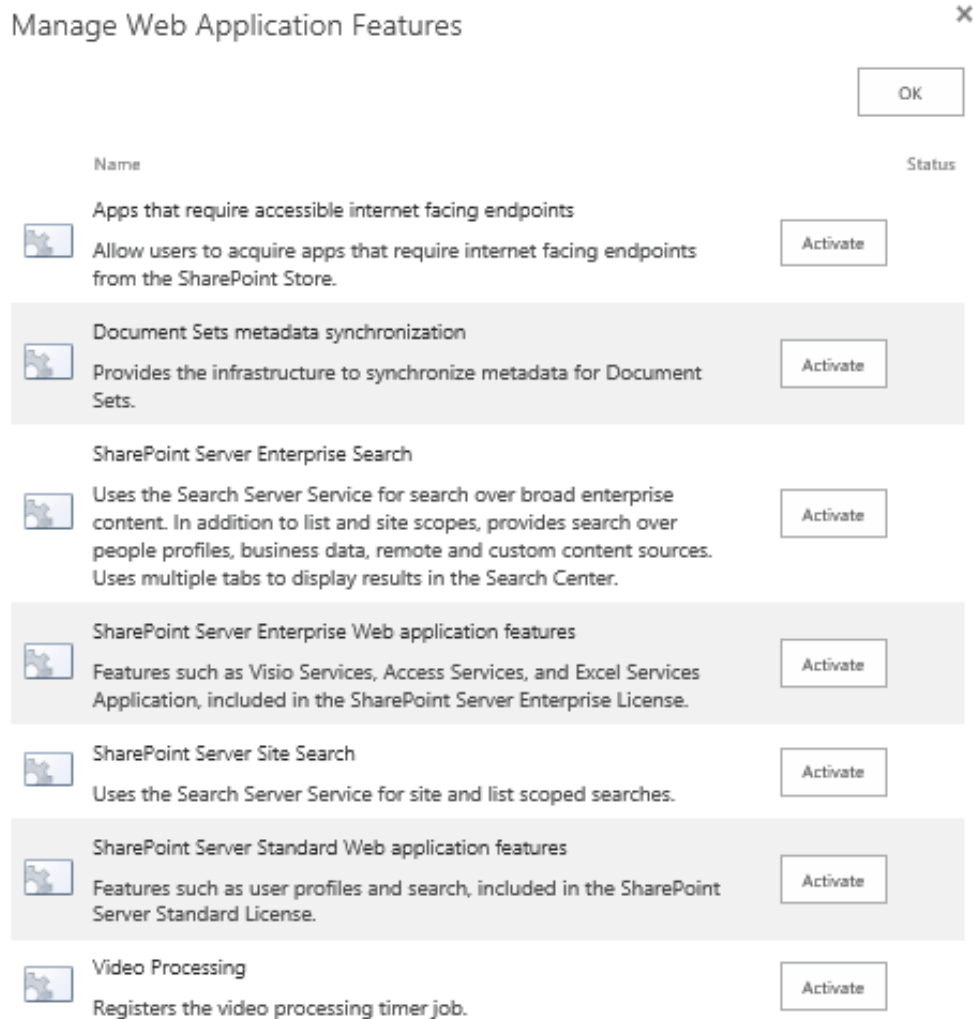


Figure 6.20 – Manage Web Application Features

This helps bring another level of feature separation to content and users for the sake of resources and company policies.

Here is how to turn on features using PowerShell:

```
Enable-SPFeature -identity "Video Processing" -URL http://  
spweb.xyzinc.local
```

Knowing the features you want to be enabled on the web application level is key. As you can see, there are some choices. Make sure to choose what level of features you want based on the URL or web application. Now that we have our main web application completed, let's move on to create a MySite web application that will create a host for personal sites used by users in the farm.

Creating a MySite web application

Let's create a MySite web application. In the field, I have noticed that a lot of admins and companies do not like MySites, which is understandable. They are nothing to be afraid of however, with SharePoint 2019 Server you can also integrate OneDrive using a hybrid connected farm. This will give us a place where users can share and store documents easily from a folder based interface similar to Shared Drives with better tools as they have the rights to manage their own files even externally.

The MySite is used to give the user a way of having what I call a SharePoint desktop. They can run applications within SharePoint against their content if they like but this has to be set up as features within the farm in central administration. Yes, they need to be planned for and storage is needed for each site collection, but if planned for properly, these sites help users keep their information centralized and not on a desktop where something might not get backed up or categorized properly. At least with MySites all the data is backed up as part of the overall SharePoint backup and a user can count on having their data restored if needed. You can also control the size of these site with Site Quotas. Please make a choice to use either OneDrive or MySites as you plan out personal files storage for your user community.

Let's look at the steps to create a MySite web application:

1. Create a new web application and name it. Add a host header if needed:

Create New Web Application

Warning: This page is not encrypted for secure communication. User names, passwords, and any other information will be sent in clear text. For more information, contact your administrator.

OK

Cancel

IIS Web Site

Choose between using an existing IIS web site or create a new one to serve the Microsoft SharePoint Foundation application.

If you select an existing IIS web site, that web site must exist on all servers in the farm and have the same name, or this action will not succeed.

If you opt to create a new IIS web site, it will be automatically created on all servers in the farm. If an IIS setting that you wish to change is not shown here, you can use this option to create the basic site, then update it using the standard IIS tools.

☐ Use an existing IIS web site

Default Web Site

☒ Create a new IIS web site

Name

XYZ SPWeb MySite Web Application

Port

80

Host Header

spmysites.xyzinc.local

Path

C:\inetpub\wwwroot\wss\VirtualDirectories\spn

Security Configuration

If you choose to use Secure Sockets Layer (SSL), you must add the certificate on each server using the IIS administration tools. Until this is done, the web application will be inaccessible from this IIS web site.

Allow Anonymous

☐ Yes

☒ No

Use Secure Sockets Layer (SSL)

☐ Yes

☒ No

Claims Authentication Types

Choose the type of authentication you want to use for this zone.

Negotiate (Kerberos) is the

☒ Enable Windows Authentication

☒ Integrated Windows authentication

NTLM

☐ Basic authentication (credentials are sent in clear text)

Figure 6.21 – Create New Web Application

2. Update the application pool and assign a service account for the web application:

Create New Web Application

Public URL
The public URL is the domain name for all sites that users will access in this SharePoint Web application. This URL domain will be used in all links shown on pages within the web application. By default, it is set to the current servername and port.
<https://go.microsoft.com/fwlink/?Linkid=114854>

Application Pool
Choose the application pool to use for the new web application. This defines the account and credentials that will be used by this service.

You can choose an existing application pool or create a new one.

Database Name and Authentication
Use of the default database server and database name is recommended for most cases. Refer to the administrator's guide for advanced scenarios where specifying database information is required.

Use of Windows authentication is strongly recommended. To use SQL authentication, specify the credentials which will be used to connect to the database.

URL

Zone

☐ Use existing application pool

☒ Create new application pool
Application pool name

Select a security account for this application pool

[Register new managed account](#)

Database Server

Database Name

Database authentication
☒ Windows authentication (recommended)
☐ SQL authentication
Account

Password

Figure 6.22 –Assign service accounts and a database name

- Update the **Database Name** field with the name of the database that will hold the site collection. Scrolling down, you will see the next section of the form:

Create New Web Application

Failover Server

You can choose to associate a database with a specific failover server that is used in conjunction with SQL Server database mirroring.

Failover Database Server

Service Application Connections

Choose the service applications that this Web application will be connected to. A Web application can be connected to the default set of service applications or to a custom set of service applications. You can change the set of service applications that a Web application is connected to at any time by using the Configure service application associations page in Central Administration.

Edit the following group of connections: default

Name	Type
☒ XYZ BCS Application	Business Data Connectivity Service Application Proxy
☒ XYZ Machine Translation Service	Machine Translation Service Proxy
☒ XYZ MMS Service Application	Managed Metadata Service Connection
☒ XYZ Secure Store Service Application	Secure Store Service Application Proxy
☒ WSS_UsageApplication	Usage and Health Data Collection Proxy
☒ Connection to XYZ Visio Graphics Service	Visio Graphics Service Application Proxy
☒ XYZ Word Automation Service	Word Automation Services Proxy

Customer Experience Improvement Program

Collect web site analytics about web pages on this web application. Please read the Administration guide before turning this on for web applications available over the public Internet.

Enable Customer Experience Improvement Program

☐ Yes
☒ No

Warning: In order for Customer Experience Improvement Program (CEIP) to collect data, both CEIP and browser CEIP, at the farm level, should be enabled.

Figure 6.23 – Service application connections

4. Assign service applications as part of the web application. If you have separate service applications, we will go over how to create those later in the chapter.
5. Add a default site collection under the MySite web application:

Create Site Collection ⓘ

Web Application
Select a web application.

Web Application: <http://spmysites.xyzinc.local/> ▼

To create a new web application go to [New Web Application](#) page.

Title and Description
Type a title and description for your new site. The title will be displayed on each page in the site.

Title:

Description:

Web Site Address
Specify the URL name and URL path to create a new site, or choose to create a site at a specific path.

URL: <http://spmysites.xyzinc.local/> ▼

To add a new URL Path go to the [Define Managed Paths](#) page.

Figure 6.24 – Create Site Collection

6. Choose **My Site Host** as a template:

Web Site Address
Specify the URL name and URL path to create a new site, or choose to create a site at a specific path.

URL: <http://spmysites.xyzinc.local/> ▼

To add a new URL Path go to the [Define Managed Paths](#) page.

Template Selection

Select a template:

Collaboration Enterprise Publishing Custom

- Document Center
- In-Place Hold Policy Center
- eDiscovery Center
- Records Center
- Business Intelligence Center
- Compliance Policy Center
- Enterprise Search Center
- My Site Host**
- Community Portal

A site used for hosting personal sites (My Sites) and the public People Profile page. This template needs to be provisioned only once per User Profile Service Application, please consult the documentation for details.

Figure 6.25 – The My Site Host template

7. Add primary and secondary site collection administrators:

Primary Site Collection Administrator

Specify the administrator for this site collection. Only one user login can be provided; security groups are not supported.

User name:



Secondary Site Collection Administrator

Optionally specify a secondary site collection administrator. Only one user login can be provided; security groups are not supported.

User name:



Quota Template

Select a predefined quota template to limit resources used for this site collection.

To add a new quota template, go to the [Manage Quota Templates](#) page.

Select a quota template:

▼

Storage limit:

Number of invited users:

Figure 6.26 – Adding site collection administrators

8. Select a quota template for this site collection.

Important Note

You can create quota templates at the beginning or end of your creation of a site collection. They can be applied to web applications using the tools within Central Administration under **Application Management | Site Collection Quotas and Locks**. Again, these can be created prior to the creation of site collections so they can be applied individually as well.

9. Setting up quotas for your site collections is key to setting limits on your site collection growth. If you followed my recommendation of having individual site collections nested in content databases, then quotas will work well for you from a management perspective. Make sure to set the quotas as per Microsoft's best practices of 2-4 GB limits. If it is a record center site collection you are creating, then you can set this to be unlimited, due to the best practice being a limited number of resources accessing the data:

Quota Templates ①

Template Name

Edit an existing quota template, or create a new template. For a new template, you can start from a blank template or modify an existing template.

☒ Create a new quota template

Template to start from

[new blank template] ▼

New template name:

Storage Limit Values

Specify whether to limit the amount of storage available on a Site Collection, and set the maximum amount of storage, and a warning level. When the warning level or maximum storage level is reached, an e-mail is sent to the site administrator to inform them of the issue.

☐ Limit site storage to a maximum of:

MB

☐ Send warning E-mail when Site Collection storage reaches:

MB

Sandboxed Solutions With Code Limits

Specifies whether sandboxed solutions with code are allowed for this site collection. When the warning level is reached, an e-mail is sent. When the maximum usage limit is reached, sandboxed solutions with code are disabled for the rest of the day and an e-mail is sent to the site administrator.

Limit maximum usage per day to:

0 points

☐ Send warning e-mail when usage per day reaches:

0 points

Figure 6.27 – Quota Templates

10. If the quota is being set for MySites, you need to understand how much storage you have available to give all your users. The same storage limits will be used for every individual MySite based on individual site collections. We need to make sure to look at the number of users and the size of the site collections you are allowing them to create.
11. MySites are handled differently once they are created. For example, if you created four content databases and created site collections using the MySite site collection template within those content databases, the sites would load balance themselves over the four databases you created. This makes separates the content well, meaning good performance for those databases.

If you need to do some creation based on departments or other criteria, you need to create these site collections by using PowerShell or by taking the database offline in the SharePoint Content Database utility. This will allow you to place the site collections in the databases you want.

Important Note

MySites should have a set quota due to situations where users may use a MySite to keep all their files. By setting a limit, users will understand how much storage space they have and will only keep relevant files in SharePoint and not keep every file on their desktop in the MySite. Quotas can be set for different types of site collections using the **Application Management** menu in Central Administration.

Quotas are very helpful for identifying the growth of content and creating plans around data size. This also helps when you have those plans identified and made into quota templates so that you can apply them quickly and easily.

Now let's look at self-service policies and how they work in the farm:

Self-service Site Collection Management ⓘ

Sites will be created under a shared host name. [Read more about security considerations when using shared host names.](#)

Web Application

Select a web application.

Web Application: <http://spmysites.xyzinc.local/> ▼

Site Collections

Allow users to create site collections in defined URL namespaces.

☒ Off

☐ On

Users can create their own Site Collections from:

http://spmysites.xyzinc.local/_layouts/15/scsignup.aspx

Quota template to apply:

No Quota ▼

Site Creation

Display the Create site command on the SharePoint Home page so users can create new sites in the location you specify

☒ Hide the Create site command

☐ Show the Create site command to users who have permission to create sites

Choose the first option to let users create new team and communication sites.

When users select the Create site command, create:

☒ A site that uses one of the new team site or communication site templates
Create new sites under:

☒ This web application:

<http://spmysites.xyzinc.local/sites> ▼

☐ The following web application:

<http://spweb.xyzinc.local> ▼

Choose the second option if you want the "Create site" command to allow users to create only default classic sites or sites from a custom form.

For both options, you can let users create sites from a custom form by entering the form URL. If you selected the first option, users can access the form by clicking "See other options" in the site creation panel.

Figure 6.28 –Self-service Site Collection Management

Here is how you enable self-site creation using PowerShell:

```
$w = Get-SPWebApplication http://spweb.xyzinc.local
$w.SelfServiceSiteCreationEnabled = $True $w.Update()
```

Setting the self-service site to **On** for MySites means that users will be able to create their own MySite from the SharePoint site. This only happens once, but this setting gives them that ability. We can also set it to **Off** and not have them create a site. This is where I see admins getting scared, but you do not have to use MySites in SharePoint; things only need to be configured so that the searching of profiles works in the environment.

Now that we have finished with the MySites web application settings, let's go back and finish up our User Profile service and MySites configuration using the following form:

My Site Settings

Use this page to manage My Site settings for this User Profile Service Application.

Preferred Search Center

Setting the preferred search center allows you to control which search center users are taken to when they execute a search from the My Site profile page.

Preferred Search Center:

Example: http://sitename/SearchCenter/Pages/

Search scope for finding people:

Search scope for finding documents:

My Site Host

Setting a My Site Host allows you to use a designated site to host personal sites. All users accessing personal sites for this Shared Services Provider will be automatically redirected to the server you specify.

If there are any existing personal sites, you must manually transfer their contents to the new location.

Note: To change the location hosting personal sites, create a new site collection at the desired location using the My Site Host site template.

My Site Host location:

Example: http://portal_site/

My Site Host URL in Active Directory

Note: This URL will be returned to the client through Exchange Auto Discovery. Use the appropriate PowerShell script to change the My Site host URL in Active Directory.

Personal Site Location

Select the location at which to create personal sites. This should be a wildcard inclusion managed path defined on the web application hosting My Sites.

Existing personal sites will not be affected.

Location: *

Example: http://portal_site/location/personal_site/

☐ User name (do not resolve conflicts)
Example: http://<My Site Host Web Application Path>/<My Site Managed Path>/username/

☐ User name (resolve conflicts by using domain_username)
Example: ../username/ or ../domain_username/

☒ Domain and user name (will not have conflicts)
Example: http://<My Site Host Web Application Path>/<My Site Managed Path>/domain_username/

Figure 6.29 – My Site Settings

The form continues:

Read Permission Level

Enter the accounts that will be granted the Read permission level in the personal site when it is created. Verify that the accounts have the correct Personalization services permissions to use personal features and create personal sites. Also, verify that the public page has the correct permissions by browsing to the permissions page on the My Site host.

Note: Accounts you add will only affect personal sites created after you added the accounts.

NT AUTHORITY\authenticated users:



Newsfeed

Select whether you want to enable activities on My Site newsfeeds.

Activities notify users of new events from people and content the user follows. Examples of activities include birthdays, job title changes, social tagging of content, new follow notifications, and more. Users can explicitly decide what activities get posted about them, and all are private by default except microblogging, which is visible to all users.

You can also enable migration if your organization makes use of legacy SharePoint 2010 activities.

- ☒ Enable activities in My Site newsfeeds
- ☐ Enable SharePoint 2010 activity migration

Email Notifications

This email address will be used for sending certain email notifications. This need not be a real monitored email address.

Select whether you want users to receive emails for newsfeed activities, such as replies to conversations in which they've participated and mentions.

String to be used as sender's email address:

rePointMySites@xyzinc.com

Example: anystring@somestring.com

- ☒ Enable newsfeed email notifications

My Site Cleanup

When a user's profile has been deleted, that user's My Site will be flagged for deletion after thirty days. To prevent data loss, access to the former user's My Site can be granted to the user's manager or, in the absence of a manager, a secondary My Site owner. This gives the manager or the secondary owner an opportunity to retrieve content from the My Site before it is deleted. Select whether or not ownership of the Site should be transferred to a manager or secondary owner before the site is deleted.

Set a secondary owner to receive access in situations in which a user's manager cannot be determined.

- ☒ Enable access delegation

Secondary Owner:

AnySecondaryAdminAccount



Privacy Settings

Choose whether you want to make all users' My Sites public by default.

By default, a user's My Site is private. This means that each person's list of followers and who that person is following is not shared with anyone. Additionally, all activities (including new follow notifications, social tagging and rating of content, birthdays, job title changes, workplace anniversary, updating ask me about, posting on a note board, and new blog posts) will be private. Choosing this option will enable all of these activities by default for all users and override whatever policies are set within People and Privacy in the Manage Policies page.

- ☒ Make My Sites Public

Figure 6.30 – My Site Settings (continued)

Input the information according to your requirements to finalize the MySite configuration, then click **OK**.

Now let's configure our managed paths, if there are any you need to configure as part of your web application. You can look at your old farm to make sure you understand how these paths need to be in place during migration processes so that the paths present in your prior environment match up with the content you are migrating:

Define Managed Paths

Included Paths

This list specifies which paths within the URL namespace are managed by Microsoft SharePoint Foundation.

Add a New Path

Specify the path within the URL namespace to include. You can include an exact path, or all paths subordinate to the specified path.

Use the **Check URL** link to ensure that the path you include is not already in use for existing sites or folders, which will open a new browser window with that URL.

Delete selected paths

Path	Type
☐ (root)	Explicit inclusion
☐ sites	Wildcard inclusion

Path: [Check URL](#)

Note: To indicate the root path for this web application, type a slash (/).

Type:

Figure 6.31 – Define Managed Paths

Managed paths are paths set when you have areas of a web application that you want to set as a standard path within the URL. So, with MySite, you will want to set the path as **/personal**, or whatever it is that is also in the configuration for MySite. This path is assigned to all MySites within the farm, so the users understand where they are within the web application. It's hardcoded upon creation and will not change, and this means that no mistakes happen when we know where a site collection can be created for MySites outside of this hard-coded path.

This is how you create a managed path using PowerShell:

```
New-SPManagedPath -RelativeUrl "HR" -WebApplication http://
spweb.xyzinc.local

$swa = Get-SPWebApplication http://spweb.xyzinc.local
$swa.SelfServiceSiteCreationEnabled = $true
$swa.Update()
```

Your web applications should be all set now:

Name	URL	Port
SharePoint Central Administration v4	http://sp2019-app1:29292/	29292
XYZ SPWeb MySite Web Application	http://spmysites.xyzinc.local/	80
XYZ SPWeb Search Web Application	http://spsearch.xyzinc.local/	80
XYZ Company Web Application	http://spweb.xyzinc.local/	80

Figure 6.32 – Web applications

Finally, we need to move our BlobCache location within our web application's default.aspx pages. This is to make sure that BlobCache does not get collected on the C drive where your OS lives. You can do this for all web applications configured to use **Remote Blob Storage (RBS)**. To do that, follow these instructions (before this, make a copy of the file for safekeeping):

1. Find your BlobCache location. In my case, this is E:\SPLogs\BlobCache:

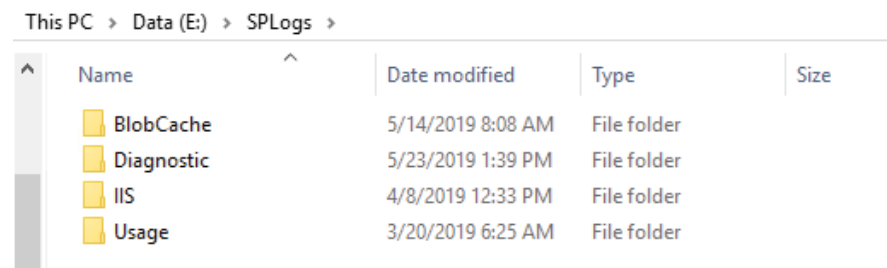


Figure 6.33 – BlobCache

2. Find `inetpub`, which is where your websites for SharePoint are running, and find the site you are looking for. Open the `wwwroot` folder:

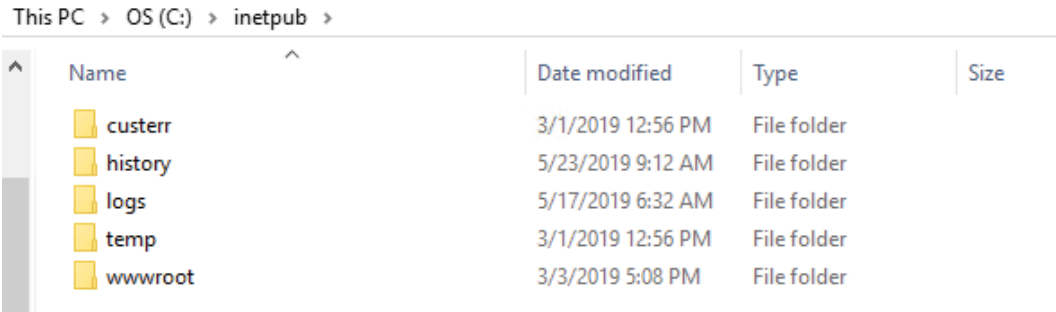


Figure 6.34 – The wwwroot folder

3. Open the `wss` folder:

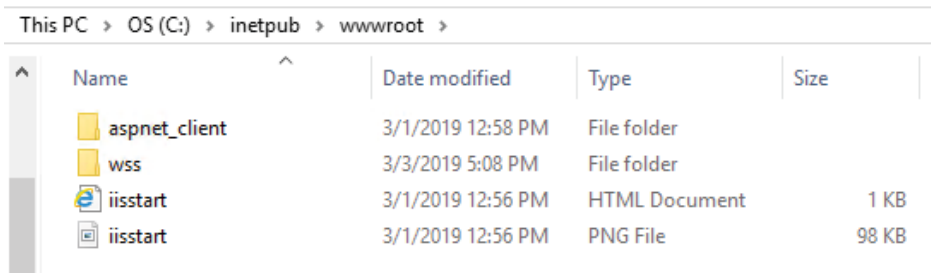


Figure 6.35 – The wss folder

4. Open the `VirtualDirectories` folder:

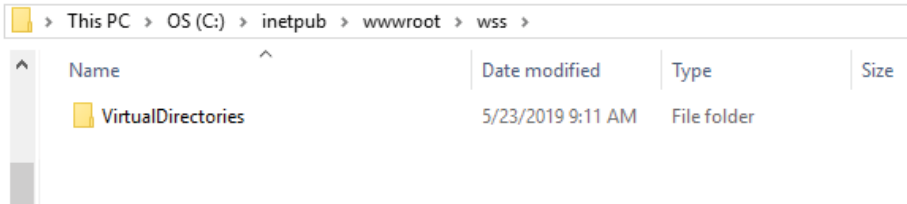


Figure 6.36 – The virtual directories folder

5. Open the folder where your website is located, which in my case is `spweb.xyzinc.local180`:

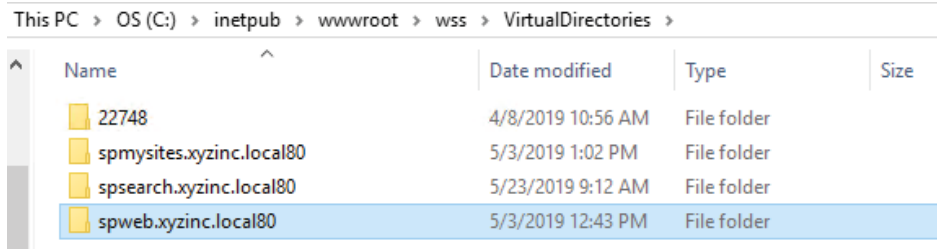


Figure 6.37 – The website location folder

6. Choose `web.config` and right-click to open and select **Open with**:

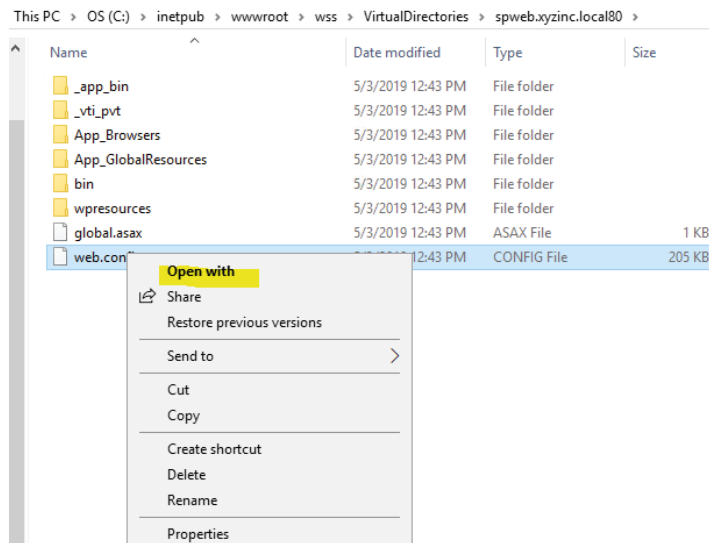


Figure 6.38 – The Open with option

7. Choose **Notepad**:

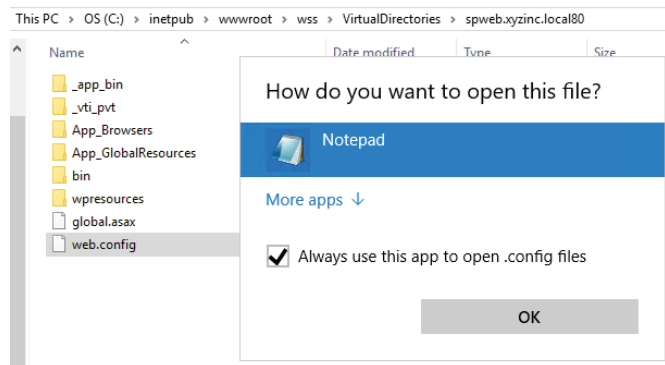


Figure 6.39 – Opening with Notepad

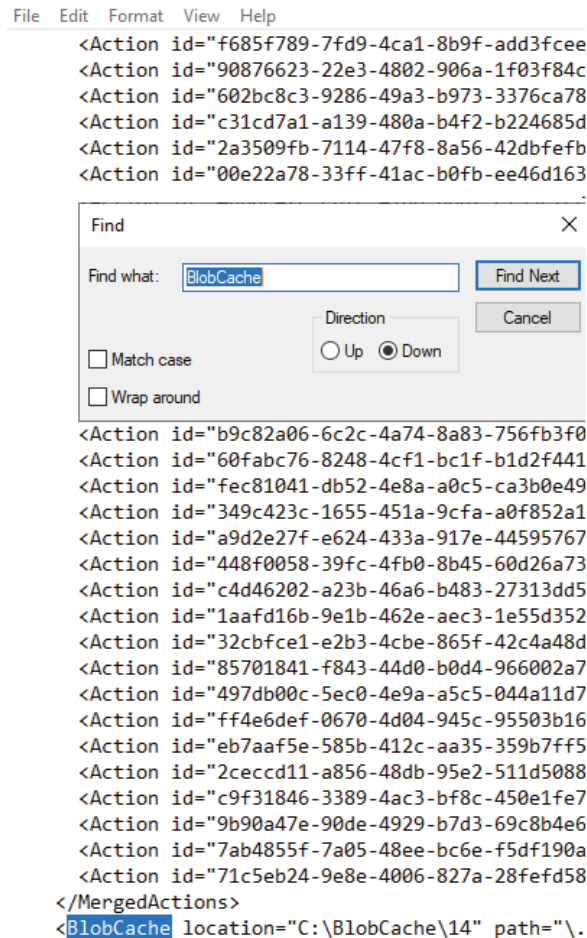
8. Click **Find** and BlobCache:

Figure 6.40 – Finding BlobCache

9. Edit the location and click **Save** :

```
<BlobCache location="E:\SPLogs\BlobCache"
```

Figure 6.41 – BlobCache location

All done! This must be completed for every server and every web application web.config!

Web Application General Settings

Each web application has a configuration for features and other areas to set the expectations of the content captured in the web application. Each web application has an area called **Web Application General Settings**. Let's look at the settings for the site collection configuration:

1. Set the time zone for the web application and other parameters:

Web Application General Settings [X]

Default Time Zone
Choose the time zone for sites that get created on this web application.

Select time zone
[(UTC-05:00) Eastern Time (US and Canada)] [v]

User Settings Provider
Choose the User Settings Provider for sites that get created on this web application.

Select User Settings Provider
[User Profile User Settings Provider] [v]

Default Quota Template
Select the quota template used by default for all site collections. Click [Quota Templates](#) to define new quota templates.

Select quota template
[No Quota] [v]

Storage limit:
Number of invited users:

Person Name Actions and Presence Settings
With additional actions and Online Status enabled, online presence information is displayed next to member names and the additional actions appear when users right-click on a member name anywhere on this site.

Enable additional actions and Online Status for members:
☒ Yes ☐ No

Alerts
Specify the default settings for alerts on this Web application.

Alerts on this server are:
☒ On ☐ Off

Maximum number of alerts that a user can create:
☒ [500] ☐ Unlimited number

[OK] [Cancel]

Figure 6.42 – Web Application General Settings

The user settings provider is the setting for the configured User Profile service provider, where you can have one or more User Profile service applications in your environment. This gives you an option to choose.

2. Please set **Browser File Handling** to what you believe it needs to be in your environment. I have mostly used **Permissive** settings as this opens files within document libraries and does not download files to the desktop:

Web Application General Settings

RSS Settings

Specify the server-wide settings for RSS feeds.

Enable RSS feeds:

☒ Yes ☐ No

Blog API Settings

Choose whether or not to enable the MetaWeblog API for this web application.

If the setting to accept user name and password is off, the currently configured authentication method will be used.

Enable Blog API:

☒ Yes ☐ No

Accept user name and password from the AP

☐ Yes ☒ No

Browser File Handling

Specifies whether additional security headers are added to documents served to web browsers. These headers specify that a browser should show a download prompt for certain types of files (for example, .html) and to use the server's specified MIME type for other types of files.

Permissive Specifies no headers are added, which provides a more compatible user experience.

Strict Adds headers that force the browser to download certain types of files. The forced download improves security for the server by disallowing the automatic execution of Web content that contributors upload.

☒ Permissive

☐ Strict

Figure 6.43 –Browser File Handling

3. Choose the options carefully:

Web Application General Settings

Web Page Security Validation

Security validations expire after a configurable amount of time, requiring the user to retry his operation.

Send User Name and Password in E-Mail

Specify whether to send users their user name and password by e-mail. If this option is turned off, a new user can't access the site until an administrator changes the user's password and notifies him or her of the new password.

Master Page Setting for Application _Layouts Pages

Choose whether or not to allow the pages in the _Layouts folder to reference site master pages. Pages in the Application _Layouts folder are available to all sites in the farm.

If this setting is on, most of the pages in the _Layouts folder will reference the site masterpage and show the customizations that have been made to that master page. When the master page is broken or unavailable, some vital _Layouts pages, such as Settings.aspx, will

Security validation is:

☒ On ☐ Off

Security validation expires:

☒ After minutes
☐ Never

Send user name and password:

☒ Yes ☐ No

Application _Layouts pages reference site master pages

☒ Yes ☐ No

4. Notice the default maximum upload size has changed. Make a change if necessary:

Web Application General Settings

Recycle Bin

Specify whether the Recycle Bins of all of the sites in this web application are turned on. Turning off the Recycle Bins will empty all the Recycle Bins in the web application.

The second stage Recycle Bin stores items that end users have deleted from their Recycle Bin for easier restore if needed. [Learn about configuring the Recycle Bin.](#)

Recycle Bin Status:

☒ On ☐ Off

Delete items in the Recycle Bin:

☒ After days

☐ Never

Second stage Recycle Bin:

☒ Add percent of live site quota for second stage deleted items.

☐ Off

Maximum Upload Size

Specify the maximum size to allow for a single upload to any site. No single file, group of files, or content, can be uploaded if the combined size is greater than this setting.

Maximum upload size:

 MB

Customer Experience Improvement Program

Collect web site analytics about web pages on this web application. Please read the Administration guide before turning this on for web applications available over the public Internet.

Enable Customer Experience Improvement Program

☐ Yes

☒ No

Warning: In order for Customer Experience Improvement Program (CEIP) to collect data, both CEIP and browser CEIP, at the farm level, should be enabled.

Usage Cookie

Choose whether to set the Usage Cookie for anonymous users of all sites in this web

Usage Cookie Status:

☐ On ☒ Off

Figure 6.45 – Recycle bin, maximum upload size, and cookie settings

Important Note

Remember that you only have a certain amount of storage designated for this environment. Set the document upload size to a setting you know you can handle as the documents really add up at these larger sizes. Also, remember that Shredded Storage is used as well to make sure that documents are not duplicated and the subset that was changed is captured in versioning.

5. The following is the PowerShell example for setting parameters within the general settings of a web application:

```
$siteURL = "http://spweb.xyzinc.local" | $webApp =  
Get-SPWebApplication $siteURL  
  
$webApp.BrowserFileHandling = [Microsoft.SharePoint.  
SPBrowserFileHandling]::Permissive
```

There are many other parameters for this command using \$webapp and the related area of focus to set parameters. The parameters for this command can be found on GitHub.

Zones

When setting up web applications in SharePoint, we have a couple of things to think about. One of them is zoning. Zoning helps us to define web application access from different URLs. Adding a URL to a zone gives the users in that zone a way to access the same content as the default zone but from another URL; for example, `hr.xyzinc.local` could be accessed through our internet zone using `hr.xyzinc.com`. Separate access pipelines could be used from a router or an ISA server perspective to have users access a site through a certain URL. This method also creates a separate IIS site as well, so you can configure the site as you would any individual site in IIS.

The different zones available to create these access points are as follows:

- Default
- Intranet
- Internet
- Extranet
- Custom

Use the zones within the configuration to determine what the URL for the alternate access mapping is being used for. This helps users to understand why URLs were created and also to put URLs in some type of category.

Alternate access mappings

Alternate access mappings also relate to zones and can be set up within SharePoint as a separate link to the content using a separate URL. This gives you many access URL points to the same content that can be supported by different zones in SharePoint.

The following figure shows the alternate access mapping that was created for the Central Administration site. The alternate access mapping URL is `http:ca.xyzinc.local`:

Alternate Access Mappings



Edit Public URLs Add Internal URLs Map to External Resource			Alternate Access Mapping Collection: Central Administration		
Internal URL	Zone	Public URL for Zone			
http://sp2019-app1:29292	Default	http://sp2019-app1:29292			
http://ca.xyzinc.local	Intranet	http://ca.xyzinc.local			

Figure 6.46 – Alternate Access Mappings

To set the alternate access mapping using PowerShell, use the following command:

```
Set-SPAlternateURL -Identity http://spweb.xyzinc.local -Zone "Internet"
```

There is another method you can use to create separate URLs, which is using extended web applications. Let's look at that method in the next section.

Extending a web application

When using the extended web application feature, we are basically creating a new IIS website that directs users to the same content that we are extending in a default zone web application. So, in short, we are duplicating the site with a new zone and URL. This extended site can be configured with a separate IP address in IIS as well because a new site is created within IIS that is separate from the default site. This is powerful because we are given the ability to have separate bindings related to this extended site in IIS. This also helps as an example for you to separate external traffic to a given site and even where this site resides on server resources. Pointing external traffic to that site, for example, it would be easy to direct traffic from external sources to this URL at that point.

The following figure shows how this would look. Two IIS websites are using the same content database:

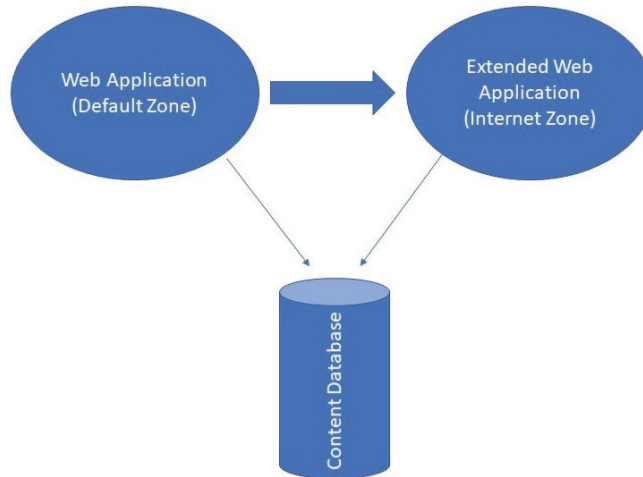


Figure 6.47 – A diagram of two web applications using the same content database

Let's look at the steps:

1. Create your extended web application and name it:

Extend Web Application to Another IIS Web Site

IIS Web Site

Choose between using an existing IIS web site or create a new one to serve the Microsoft SharePoint Foundation application.

If you select an existing IIS web site, that web site must exist on all servers in the farm and have the same name, or this action will not succeed.

If you opt to create a new IIS web site, it will be automatically created on all servers in the farm. If an IIS setting that you wish to change is not shown here, you can use this option to create the basic site, then update it using the standard IIS tools.

☐ Use an existing IIS web site

Default Web Site

☒ Create a new IIS web site

Name

XYZ SPWeb Extended Web Application

Port

80

Host Header

spweb.xyzinc.com

Path

C:\inetpub\wwwroot\wss\VirtualDirectories\spv

Security Configuration

Kerberos is the recommended security configuration to use with Integrated Windows authentication. Kerberos requires the application pool account to be Network Service or special configuration by the domain administrator. NTLM authentication will work with any application pool account and the default domain configuration.

If you choose to use Secure Sockets Layer (SSL), you must add the certificate on each server using the IIS administration tools. Until this is done, the web application will be inaccessible from this IIS web site.

Authentication provider:

☐ Negotiate (Kerberos)

☒ NTLM

Use Secure Sockets Layer (SSL)

☐ Yes

☒ No

Public URL

The public URL is the domain

URL

Figure 6.48 – Extend Web Application to Another IIS Web Site

2. Choose your authentication method and the zone that this extended web application should belong to:

Extend Web Application to Another IIS Web Site

If you opt to create a new IIS web site, it will be automatically created on all servers in the farm. If an IIS setting that you wish to change is not shown here, you can use this option to create the basic site, then update it using the standard IIS tools.

Host Name

spweb.xyzinc.com

Path

C:\inetpub\wwwroot\wss\VirtualDirectories\spw

Security Configuration

Kerberos is the recommended security configuration to use with Integrated Windows authentication. Kerberos requires the application pool account to be Network Service or special configuration by the domain administrator. NTLM authentication will work with any application pool account and the default domain configuration.

Authentication provider:

☐ Negotiate (Kerberos)

☒ NTLM

Use Secure Sockets Layer (SSL)

☐ Yes

☒ No

If you choose to use Secure Sockets Layer (SSL), you must add the certificate on each server using the IIS administration tools. Until this is done, the web application will be inaccessible from this IIS web site.

Public URL

The public URL is the domain name for all sites that users will access in this SharePoint Web application. This URL domain will be used in all links shown on pages within the web application. By default, it is set to the current servername and port.
<https://go.microsoft.com/fwlink/?LinkId=114854>

URL

http://spweb.xyzinc.com:80

Zone

Intranet

OK

Cancel

Figure 6.49 – Choose an authentication method

3. To create an extended web application using PowerShell, use the following command:

```
Get-SPWebApplication -Identity https://spweb.xyzinc.com
| New-SPWebApplicationExtension -Name XYZ SPWeb External
Web Application -HostHeader spwebexternal.xyzinc.com
-Zone Internet -URL https://spwebexternal.xyzinc.com
-Port 443 -AuthenticationProvider NTLM
```

Now that we have finished configuring the web application, let's learn about service associations, which we discussed earlier in this chapter.

Associating services

Service association is very important, and this is a configuration that I do not see a lot of companies using even when they have a bunch of web applications running in a farm. Creating default services is great if you have one web application, but if you have many, we should use this configuration method to help isolate services. Some web application content may not use all the services configured in a farm. So, why should we associate services that they will not use?

Let's associate services in the following steps so that you can see how this can help you in managing your server resources and make better choices in configuring your environment. As you can see, there are two web applications in the following figure:

Service Application Associations ⓘ

View: Web Applications ▾		
Web Application / Service Application	Application Proxy Group	Application Proxies
XYZ Company Web Application (http://spweb.xyzinc.local/)	default	WSS_UsageApplication
XYZ SPWeb MySite Web Application (http://spmysites.xyzinc.local/)		XYZ Machine Translation Service
		XYZ BCS Application
		XYZ Secure Store Service Application
		XYZ MMS Service Application
		Connection to XYZ Visio Graphics Service
		XYZ Word Automation Service

Figure 6.50 – Service Application Associations

Right now, there is only one configured proxy group, which needs to be changed based on our requirements. Let's look at the steps:

1. Create your new service application to support your new web application:

New Visio Graphics Service Application

Visio Graphics Service Application Name: XYZ MySite Visio Graphics Service

Application Pool:
Choose the Application Pool to use for this Service Application. This defines the account and credentials that will be used by this web service.
You can choose an existing application pool or create a new one.

☐ Use existing application pool
SecurityTokenServiceApplicationPool
☒ Create new application pool
Application pool name: xyzmysite-visio-app-pool
Select a security account for this application pool: XYZINC\spservice
[Register new managed account](#)

Create a Visio Graphics Service Application Proxy:
☒ Create a Visio Graphics Service Application Proxy and add it to the default proxy group

OK Cancel

Figure 6.51 – New Visio Graphics Service Application

2. Choose the **[custom]** configuration in the dropdown for service application associations so that we can separate the services that support each web application:

Configure Service Application Associations

Edit the following group of connections: [custom]

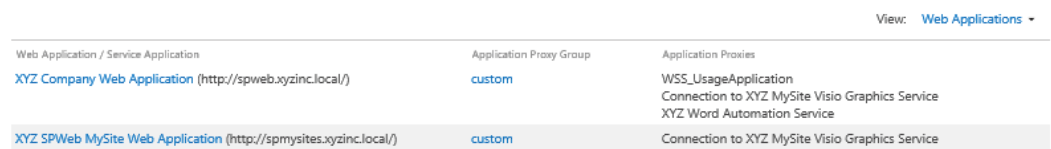
Name	Type
☐ XYZ BCS Application	Business Data Connectivity Service Application Proxy
☐ XYZ Machine Translation Service	Machine Translation Service Proxy
☐ XYZ MMS Service Application	Managed Metadata Service Connection
☐ XYZ Secure Store Service Application	Secure Store Service Application Proxy
☐ WSS_UsageApplication	Usage and Health Data Collection Proxy
☒ Connection to XYZ MySite Visio Graphics Service [default]	Visio Graphics Service Application Proxy
☐ Connection to XYZ Visio Graphics Service [set as default]	Visio Graphics Service Application Proxy
☐ XYZ Word Automation Service	Word Automation Services Proxy

OK Cancel

Figure 6.52 – The [custom] option

3. Choosing **[custom]** now allows us to see that we have two separate service association configurations:

Service Application Associations ⓘ



Web Application / Service Application	Application Proxy Group	Application Proxies
XYZ Company Web Application (http://spweb.xyzinc.local/)	custom	WSS_UsageApplication Connection to XYZ MySite Visio Graphics Service XYZ Word Automation Service
XYZ SPWeb MySite Web Application (http://spmysites.xyzinc.local/)	custom	Connection to XYZ MySite Visio Graphics Service

Figure 6.53 – Separate service association configurations

4. Use the following command to do this using PowerShell:

```
Add-SPServiceApplicationProxyGroupMember -Identity < the  
service application proxy group > -Member <members to add  
to the service application proxy group>
```

Remember to always run PowerShell as administrator. This concludes the configuration for service application associations. Now let's move on to setting cache accounts for our farm.

Setting cache accounts

Cache accounts are very important accounts that serve the web application for duties such as storing properties about items within content in a SharePoint site. This reduces the load on the SQL server supporting the SharePoint farm, which also improves request latency. Items stored in the cache provide the items used by the publishing feature when it renders web pages. If you do not have these accounts, you will see weird things happening on the site, such as you not being able to log in anymore.

Please make sure to add these two accounts, one for super user and one for super reader, before migrating any content and letting users do any testing. These accounts do not need to be managed accounts – as you can see in the PowerShell script, passwords are nonexistent – so to avoid any issues, I personally keep these out of the managed accounts list. To add these accounts, you will need to use PowerShell.

Use this PowerShell command to set cache accounts for your web applications:

```
$wa = Get-SPWebApplication http://spweb.xyzinc.local
$wa.Properties["portalsuperuseraccount"] = "i:o#.w|xyzinc\
swritecache"
$wa.Properties[:portalsuperreaderaccount] = "i:o#.w|xyzinc\
sreadcache"
$wa.Update()

$wa = Get-SPWebApplication http://spweb.xyzinc.local
$zp = $wa.ZonePolicies("Default")
$policy = $zp.Add("i:o#.w|xyzinc\swritecache", "Portal Super
User")
$policyRole = $wa.PolicyRoles.GetSpecialRole(:FullControl")
$policy.PolicyRoleBindings.Add($policyRole)
$policy = $zp.Add("i:o#.w|xyzinc\sreadcache", "Portal Super
Reader")
$policyRole = $wa.PolicyRoles.GetSpecialRole("FullRead")
$policy.PolicyRoleBindings.Add($policyRole)
$wa.Update()
```

These settings are key to the performance of the farm. Without them, you could see a slowdown or no response at all. Make sure to complete this step before going live for the new sites in your new farm.

Summary

This chapter showed how SharePoint configuration is not as easy as people would believe. It does take some documentation, design, and thought to make it happen. We didn't even cover all that we need to do. Again, there are varying configurations and other integrations that could have happened here. Our aim in this book is to cover the basics and add some details to get you thinking about how you can make things work in your environment.

We covered a lot in this chapter, but the main point of this chapter was to make sure you have covered all your areas of focus. In the end, you do not want to release a product that is not complete. Make sure you have documented your backup and restore process and that you follow best practices for all your configurations. Double-check things and work with the departments to resolve any issues upfront and make sure to tell them about any foreseen issues beforehand. The more communication before going live, the better.

In the next chapter, we will talk about more final configurations and other integrations needed within the farm. Workflow Manager is a big part of the integrations needed to make this farm work successfully, give the farm some useful tools for the users to collaborate, and automate business processes.

Other topics covered will include authentication and more on migration. We have mentioned migration many times in this book, but in the next chapter, we will cover more on this topic to help you choose the best tool for you or use a content database and other methods that are available.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. When creating web applications for users, which web application zone must be created first before we can start extending web applications and adding alternate access mappings?
2. Which method for migration could be used best if there were no custom solutions involved within the content?
3. When crawling content, how does the crawler connect to the content?
4. How many items must be available in the farm's search item count before we need to upgrade the Search service to a cloned service?
5. When configuring the User Profile service, what account must be added to the administrators group of the server running the service?
6. True or false: A MySite is a mandatory web application that needs to be created as part of the SharePoint farm.

7

Finalizing the Farm to Go Live – Part II

As you will see, in this chapter, we still have a lot of areas to account for. These areas are very important to talk about as they relate to finalizing the farm and the content to be presented within our sites. Load balancing is also another area we will talk about. This process is usually planned in advance but is typically saved for last. We will also cover migration as you will need to have your environment set up to migrate your content from the prior farm.

We will also install Workflow Manager in this chapter and show you how to set up the application step by step. We will provide tips on what's important to understand as part of this solution integration. Workflow Manager is pretty easy to install but has some requirements you may need to be aware of before you start the configuration process. We'll address these in this chapter.

Finally, we want to make sure we have covered all our bases. I can't stress this enough, which is why you will hear me say this many times during these last few chapters: we must look at our old environment and make sure we have accounted for everything so that we can move forward gracefully.

In this chapter, the following topics will be covered:

- Understanding workflows and Workflow Manager
- Authentication
- Understanding load balancing
- Exploring SharePoint migration
- Exploring farm solutions
- Carrying out testing
- Performing the final checks
- Backup and restore

Let's get started!

Technical requirements

To understand this chapter and the knowledge provided within, you must meet the following requirements:

- 3-5 years of experience configuring SharePoint
- 3-5 years of experience using SharePoint Server

You can find the code files present in this chapter in this book's GitHub repository at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Understanding workflows and Workflow Manager

Within SharePoint, workflows are a form of automation and provide business processes with documents and content within lists. How do we migrate them from older versions of SharePoint? In some cases, you will have to recreate workflows, especially those created in Visual Studio as custom developed solutions. If you have some out of the box workflows, you can investigate whether the tool you're using will migrate them for you without any other manual involvement. Make sure to use mappings for any accounts missing from **Active Directory (AD)**, mappings that have been retired due to employees leaving the company, and mappings for content types and other columns that may not be present in the newer version of SharePoint.

You will also notice that, in Microsoft 365 SharePoint Designer 2010, workflows have been discontinued. In SharePoint 2019, however, these workflows are still supported. SharePoint 2019 Server gives you the option to move sites back to on-premises if need be. This gives you time to figure out a more suitable way to overcome the discontinuance of 2010 workflows in the cloud. You can also use Power Tools to redevelop them, which is a learning process. I am mentioning this here because you should not confuse Microsoft 365 and SharePoint On-Premises. These platforms are different and abide by different rules and guidance. You control your On-Premises environment and as long as the workflow platform can be configured, you can use it with SharePoint 2019 Server, which I believe will never go away.

One of the main issues I see most customers having during migrations is that they don't know how many workflows they have in their environment. If you want to find out where your workflows are located from a web application perspective, there are PowerShell scripts you can use to find workflows in a web application and even a site collection, but your best bet is to spot check for these manually. I have seen some errors where PowerShell could not find all workflows, so manual checks as well as PowerShell would work in this case. You can also make this a task for your site collection admins as they know their processes and can give you a good count. This is why spreading out responsibility is very important; a farm admin will not know everything. The one thing that can come out of this is identifying unused workflows, which could be flagged for deletion. This helps clean up stale content before migration.

Installing Workflow Manager

You need to install and configure Workflow Manager 1.0 in your SharePoint 2019 environment to support workflows within SharePoint 2019. The choice of what server you want this service to run on is yours. The best choice, however, is to install it on its own server so that the service can be isolated from using resources related to user and other service traffic. On the same note, I recommend setting this up on its own server because of the integration and failures that can happen with the application being installed on a SharePoint server.

Workflow Manager, although related to the SharePoint 2013 and 2016 products, works with SharePoint Server 2019. Do not worry about the outdated release of this product based on its name (year); this product works and is just as stable in the newer version of SharePoint. You can take a backup of your current Workflow Manager databases if you're migrating and restoring them in a SharePoint 2019 environment as part of the SQL Management process. You can then move forward with your configuration as you would with any other service application installation, using those databases to configure the new environment.

To create a farm of Workflow Manager servers, you need to log in as the Setup/Admin account for SharePoint on all servers. As part of this farm, the configuration does not use built-in accounts for the services. Only three servers are needed to support high availability. Please use a separate server for this installation and do not install this application as an addition to any SharePoint Server, although it can be configured that way. **This is highly recommended!**

Remember to create a separate service account and log in with that account to run the workflow manager. You can also run this using the **Web Platform Installer** for the workflow manager 2013 executable and follow the steps given here for its installation:

1. The Web Platform Installer can be found here: <https://docs.microsoft.com/en-us/iis/install/web-platform-installer/web-platform-installer-direct-downloads>. Right-click and install it, making sure to select **Run as administrator**:

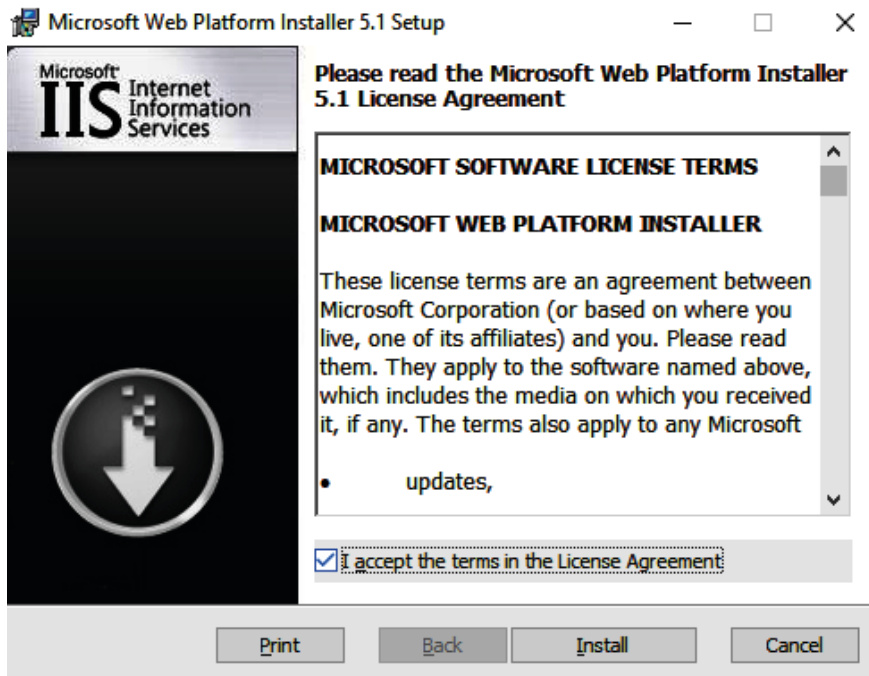


Figure 7.1 – Accepting the License Agreement for Web Platform Installer

2. Click **Yes** to allow this app to make changes to your device:

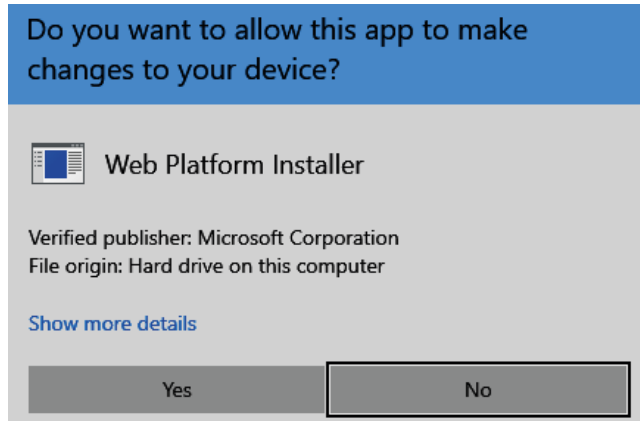


Figure 7.2 – Verifying the installation

3. A splash screen will appear while the installation file is loading:



Figure 7.3 – Installation splash screen

4. Click **Install** to start the installation process:

Workflow Manager 1.0 for existing installs only - Use Workflow Manager Refresh (CU2) for new installs

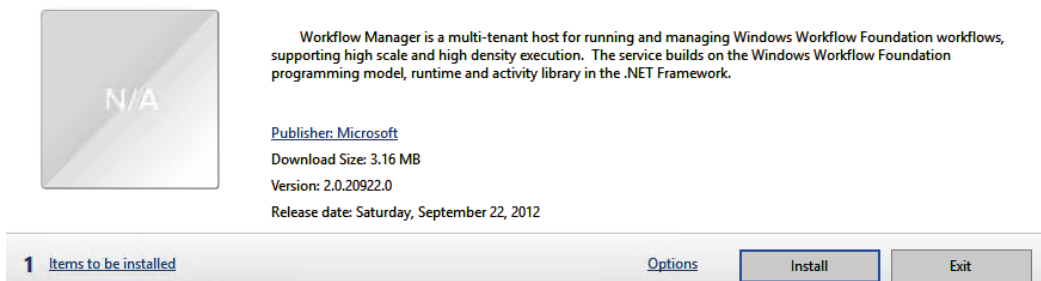


Figure 7.4 – Choosing to Install Workflow Manager

5. Click **I Accept** to accept the license agreement:

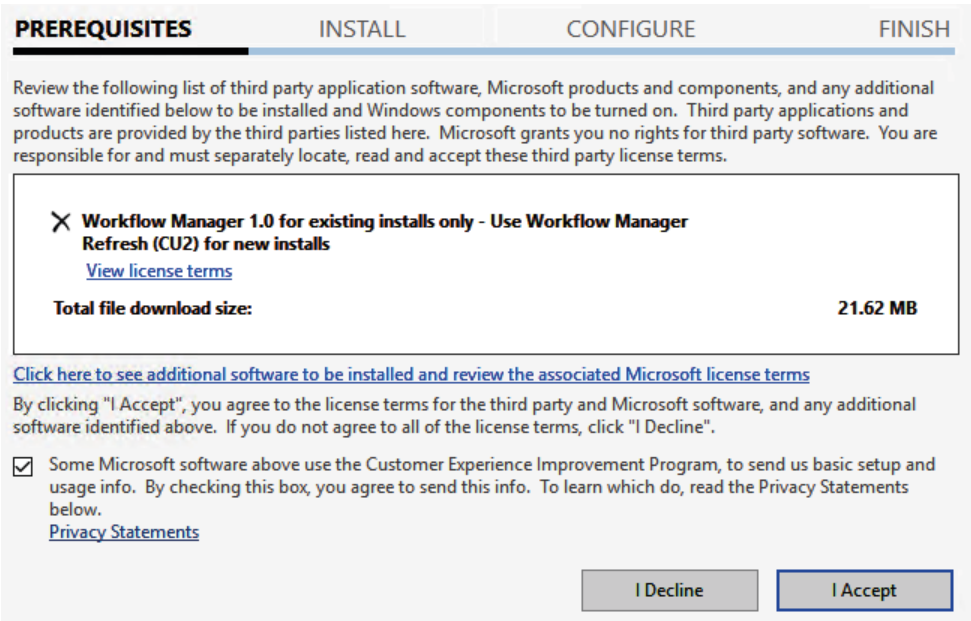


Figure 7.5 – Accepting the license agreement for Workflow Manager

6. A splash page will appear, showing the progress of the installation:

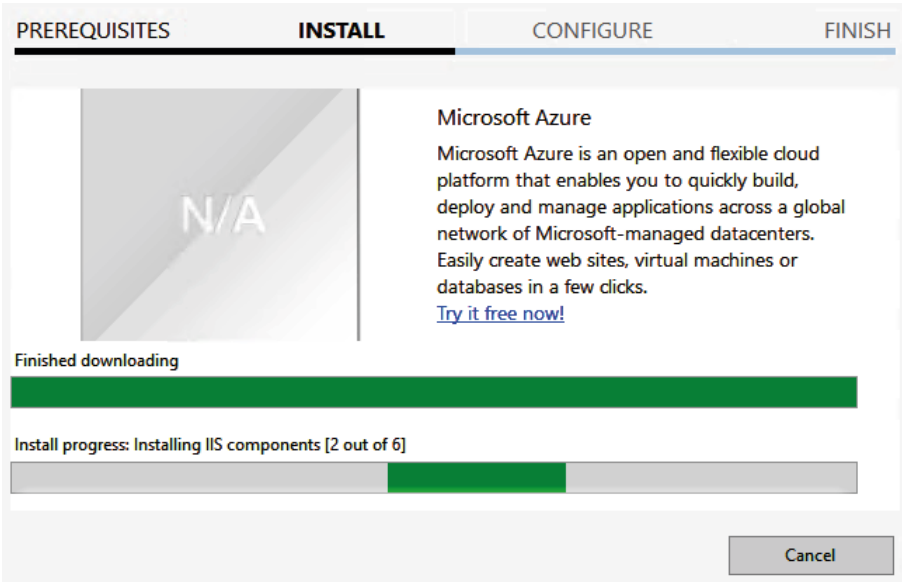


Figure 7.6 – Installation progress screen

7. Click **Continue** to configure Workflow Manager:

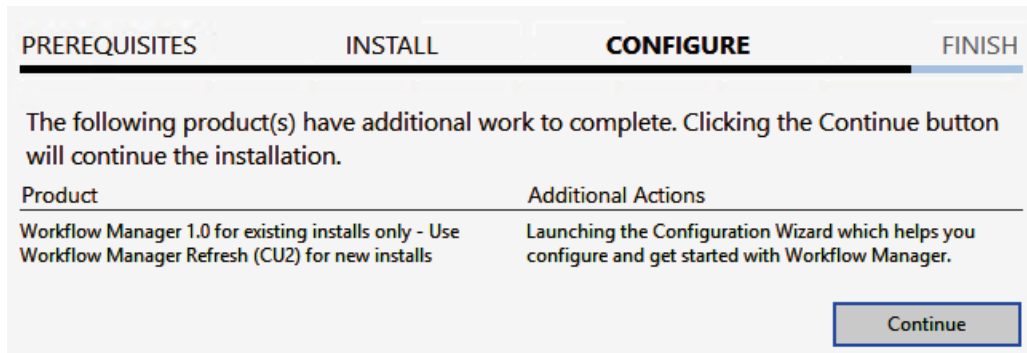


Figure 7.7 – Continuing to configure the service

8. I used the **(Recommended)** default configuration for my installation:

WORKFLOW MANAGER CONFIGURATION WIZARD

Welcome

This wizard helps you configure a Workflow Manager farm. The wizard also configures the Service Bus farm required by the Workflow Manager farm.

- ➔ **Configure Workflow Manager with Default Settings (Recommended)**
Apply default configuration settings and configure Workflow Manager on the machine. A Workflow Manager farm will be created and you can join other computers to the farm later.
 - ➔ **Configure Workflow Manager with Custom Settings**
Override default configuration settings to configure Workflow Manager on the machine. A Workflow Manager farm will be created and you can join other computers to the farm later.
 - ➔ **Join an Existing Workflow Manager Farm**
Choose this option to add this computer to existing Workflow Manager farm and Service Bus farm.
- ❗ Performing configuration operations simultaneously from multiple computers or configuration wizards is not supported.

Figure 7.8 – Choosing the type of installation

You may want to do make custom configurations, which requires you to use the **Configure Workflow Manager with Custom Settings** option. I recommend using this option if you have any requirements outside of the basic configuration as you can add those to the configuration. You can refer to Microsoft's documentation for further information on the custom installation of Workflow Manager 2013.

9. Update SQL Server, which in my case is a SQL alias name. Also, input the farm's account and password. If you want to run Workflow Manager using HTTP, you must check the **Allow Workflow management over HTTP on this computer** box. Input a key that acts as a secret password for the certificate. This allows you to add new servers to the Workflow Farm:

WORKFLOW MANAGER CONFIGURATION WIZARD

New Farm Configuration

Provide mandatory configuration parameters that are required for creating databases and run services in the Workflow Manager farm. The same configuration will be used for the Service Bus farm.

SPSQLCONNECT

Test Connection

Advanced Options

Configure Service Account

User account under which the services will run (RunAs Account) using the format 'domain\user' or 'user@domain'. Credentials for the same account are required every time you join a computer to the farm.

USER ID

xyzinc\spfarm19

PASSWORD

●●●●●●●●

☒ Allow Workflow management over HTTP on this computer

☒ Enable firewall rules on this computer

Certificate Generation Key

This key is required every time you join a computer to the farm.

●●●●●●●●●●●●●●●●●●●●

Figure 7.9 – Updating the service account and generation key

I used my certificate for Secure Store but changed some of the characters.

10. Once you've input all the configuration details, you have the opportunity to go back and make changes using the back arrow at the bottom-right corner. If you are satisfied with the configuration, just click the tick button to start the configuration process:

WORKFLOW MANAGER CONFIGURATION WIZARD

Summary

This page lists changes that the configuration wizard will apply.

⬅ Configuration for Workflow Manager

Management Database SQL Instance	SPSQLCONNECT
Enable SSL connection with SQL Server instance	False
Authentication	Windows Authentication
Management Database Name	WFManagementDB
Instance Management Database SQL Instance	SPSQLCONNECT
Enable SSL connection with SQL Server instance	False
Authentication	Windows Authentication
Instance Management Database Name	WFInstanceManagementDB
Resource Management Database SQL Instance	SPSQLCONNECT
Enable SSL connection with SQL Server instance	False
Authentication	Windows Authentication
Resource Management Database Name	WFResourceManagementDB
RunAs Account	xyzinc\spfarm19
RunAs Password	*****
Certificate Generation Key	*****
Workflow Manager Outbound Signing Certificate	Auto-generated
Service SSL Certificate	Auto-generated
Encryption Certificate	Auto-generated
Workflow Manager Management Port	12290
HTTP Port	12291

[Copy](#) [Get PowerShell Commands](#)



Figure 7.10 – Summary of your configuration settings

11. As the configuration process starts to work, you will notice that it goes through a series of processes that need to be completed:

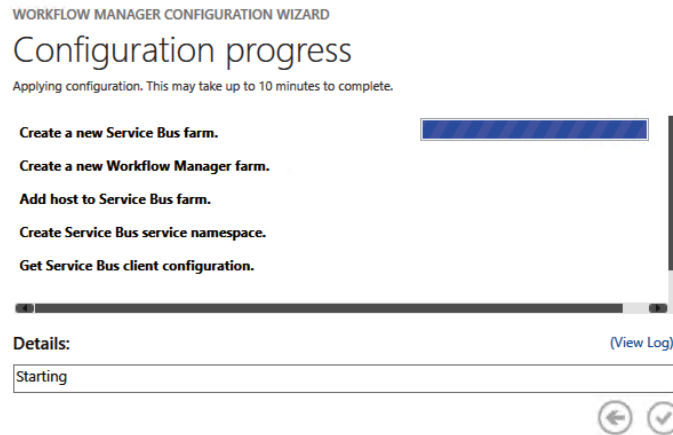


Figure 7.11 – Configuration progress screen

12. Please make sure to install the Workflow Client on all the servers in the farm:

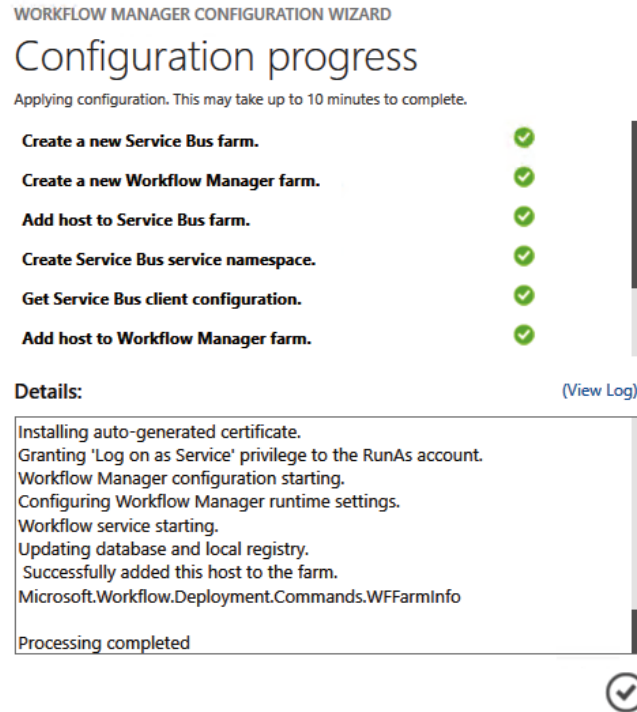


Figure 7.12 – Workflow Manager installation completed successfully

For the client to work, you will need to create a self-signed certificate from the Workflow Server and install it on the SharePoint servers, in the Trusted Provider folder in Certificate Manager.

This is a requirement and will complete the installation process. Please click the checkbox to close the installation screen.

If you didn't use the right service account for Workflow Manager, you can update it using the following PowerShell command:

```
Stop-SBFarm
Set-SBFarm -RunAsAccount Domain\Username
$RunAsPassword = ConvertTo-SecureString -AsPlainText -Force
'<password>'
[RunOnAllNodes] Update-SBHost -RunAsPassword $RunAsPassword
Start-SBFarm
```

If you do not verify that Workflow Manager PowerShell is activated, you will get the following error:

```
Error: The term 'Set-SBFarm' is not recognized as the name of a
cmdlet, function, script file or operable program.
```

So, before you try to update the account, make sure you have PowerShell for Workflow Manager active. To do this, go to **Start | All Programs | Workflow Manager | Workflow Manager PowerShell**.

Then, use the following command to set the Workflow Manager Service Account:

```
Stop-SBFarm Set-SBFarm -RunAsAccount Domain\Username
$RunAsPassword = ConvertTo-SecureString -AsPlainText -Force
'<password>' [RunOnAllNodes] Update-SBHost -RunAsPassword
$RunAsPassword Start-SBFarm
```

To check your installation using the Workflow Manager Shell, use the following command:

```
Get-WFFarm
```

You can also use the following command, which checks the status of your farm:

```
Get-WFFarmStatus
```


To register Workflow Manager to a web application for use with out of the box SharePoint workflows and SharePoint Designer workflows, please use the following command:

```
Register-SPWorkflowService -SPSite "https://site.yourcompany.com" -WorkflowHostUri "https://your.workflowurl.com:12290" -force
```

To find your WorkflowHostUri, use the following command:

```
Add-PSSnapin Microsoft.SharePoint.Powershell
$wfProxy = Get-SPWorkflowServiceApplicationProxy
$wfProxy.GetWorkflowServiceAddress((Get-SPSite -Limit 1 -WarningAction SilentlyContinue))
```

This will complete the installation of Workflow Manager for integration with SharePoint 2019. Please remember to install this integration on a separate server. It is better to keep all integrations, even Office Web Apps and other server integrations, separate when possible so that if the product fails or has complications, it does not affect your farm as well. How much harm is one more server with a few resources going to do in comparison to having a product you cannot uninstall or may cause damage to your farm? Separate everything you can, and it will save you from issues in the long run.

Authentication

Authentication is used in SharePoint 2019 to validate a user for the purpose of using SharePoint sites, lists, libraries, and documents within the farm. SharePoint then authorizes use after verifying the user has rights to a particular site within the farm. You will see this process when you use Fiddler to troubleshoot issues from a desktop where a user is signing in. You will notice a 401 error right from the start, before the user actually enters their username and password. This is to make sure the authorization has completed. It does this by authenticating to a security source first before access to the site can be given.

The default authentication for SharePoint is Windows authentication. Microsoft has always made Active Directory available for use as an authentication method for user accounts since SharePoint 2007, along with other methods we will talk about in this section. Active Directory is well-known as an authentication provider and used solely in some cases by companies who use SharePoint. It is still used as a valid authentication method in SharePoint 2019. It is also used for the service and administrative accounts that are used to configure and support the farm. In some cases, you will see that service and administrative accounts will be used within Active Directory and that all user accounts may use another claims provider to authenticate to the sites. We will talk about this later in this section.

Forms-based authentication is supported in SharePoint 2019, as well as in SharePoint 2016. Things have changed, and basic authentication and other forms of authentication that were once offered as default methods are no longer offered anymore. **Security Assertion Markup Language (SAML)** is one of the methods that is new to the group of supported authentication methods but not new to SharePoint Admins. **Forms-based authentication (FBA)** is still available if needed for the support of SQL Membership Providers, which is a somewhat common way to configure authentication in SharePoint in some use cases. This method is not very secure but carries some value for external farms and sites due to exposing only trivial accounts, not Active Directory accounts, to the internet.

To integrate with SharePoint 2016 and 2019 using alternative methods that support other authentication providers such as Basic Authentication, you will need to use Microsoft Identity Manager to implement a solution that supports them. There are also cloud providers such as Okta that provide claims-based authentication, which helps in defining processes for authentication using solutions within SharePoint from the cloud. Depending on what you're planning to provide, there are many options out there. Using a cloud-based solution poises you to be ready for any migrations to the cloud in the future.

Claims authentication

There are many ways to integrate claims authentication methods. Out of the box, SharePoint does this automatically using **Active Directory (AD)** and Claims Tokens, changing the user account in Active Directory to claims identities. As we saw in *Chapter 6, Finalizing the Farm – Going Live*, there is a service, called the User Profile Service, that requires you to use a service account for SharePoint to connect to it. This account is given replication rights access to AD to basically store a copy of the user list you choose within SharePoint. In SharePoint, you would then also set up the User Profile Service to pull in user identity profiles from AD into SharePoint. Based on those identities, the accounts can add to sites and content within SharePoint. If they are not listed, they will not be able to authenticate, which is why you should run this process on a schedule.

Within Okta, a cloud-based claims provider, there is a two-fold process for adding users to what is called, in Okta, an Application. You can add a user to a SharePoint site, but they will not get access to the content until that user has been mapped to the Application in Okta. This helps with managing users because if they do not have an account in Okta and are mapped to the application, which is the URL of a Host Named Site Collection or Path-Based Web Application, they still won't get access to the site.

Again, there are some third-party companies that do offer cloud authentication integration with SharePoint. Most companies I have seen, such as Okta for on-premises integration, use farm solutions that have been deployed on the farm to support claims authentication. This is a great way to integrate a solution for authentication, but what happens when a solution breaks or gets retracted by accident? That's when you have an issue. This is my only reservation when using Farm Solutions, because too many things can happen that can cause big problems in the on-premise environment. Some things you can do to control changes are as follows:

- Control the Central Administration site by only adding admins to the Farm Admin Group.
- Implement a change management process to manage changes in the environment.
- Clean up all old identities within your AD, Farm Admin group, and Cloud Provider Admin group.
- **Always** use Service Accounts to run your services on cloud solutions.
- Never use a personal account for your farm installation or any service accounts used in configuration.

Please follow these recommendations to deflect any mishaps within your environment.

Windows authentication

Windows authentication is available in SharePoint 2019 and if you are coming from an older version of SharePoint like SharePoint 2007 which uses Classic Authentication, you will need to update your web applications so that they can use Windows authentication, which is really just Claims Authentication. This has been in place since SharePoint 2010 and the conversion needs to happen now. There is no way around this, and there is a process you need to follow to migrate your accounts. Classic authentication is no longer supported and was deprecated in SharePoint 2013. If you are migrating from one of the older versions of SharePoint, then you want to convert your identities into claims identities using PowerShell.

Note

Refer to the following link for more information on this process:
<https://docs.microsoft.com/en-us/sharepoint/upgrade-and-update/migrate-from-classic-mode-to-claims-based-authentication-in-sharepoint-2013>

There are other protocols that integrate with Windows authentication as well. Both NTLM and Kerberos are methods that help users authenticate without prompts for credentials, which in some cases can happen many times until they are fully authenticated. This happens when there are hops within the authentication where it needs to be verified by different content within your site. This could be an image or even a broken inheritance library, but SharePoint will not let you fully be free until you have been verified by all the content within the site.

NTLM

In this protocol, in most cases, no setup or configuration will be needed for this authentication method. The reason for that is it is most likely integrated already if you're using a Windows Server or client. When you set up your web applications, you will see the option for this protocol, which you can select from the list provided.

Kerberos

This is another selection you will see when creating web applications in SharePoint. This is known as a ticketing authentication process and requires some configuration in Active Directory. The client and server computers used within a configuration must have a trusted connection to the domain's **Key Distribution Center (KDC)**. When configuring Kerberos, you need to set up **Service Principal Names (SPNs)** in AD DS. This must be completed before you install SharePoint because these configurations must be available to SharePoint before it is up and running.

The use cases for Kerberos have been listed here so that you can see how it can be used to help secure your environment. This is better than using out of the box authentication methods:

- Kerberos requires the use of the Strongest Integrated Windows authentication protocol, which supports advanced features and allows the mutual authentication of clients and servers.
- Allows the delegation of client credentials.

- Kerberos requires the least amount of network traffic to AD DS domain controllers, and it can increase the number of pages a web frontend server can serve in some scenarios.
- Kerberos is an open protocol supported by many platforms and vendors.

Figure out if Kerberos is the method you want to use for your implementation. This should have been discussed back in the planning stage as well. There is a lot to learn when building SharePoint farms, so make sure you investigate and make the right choice for your environment.

SAML authentication

SAML token-based providers are more than popular these days because most companies have moved to using Federated Authentication methods. You can use single sign-on and smart cards to complete this authentication process for convenience within the environment. This brings a seamless process so that users can authenticate once to many resources and sites within an environment without the need to log in.

Many domains can also be authenticated using this method. It can even be used in collaboration with other companies that may be partners since the authentication to other federated domains can be included in this implementation. This gives users many options when it comes to collaboration, as well as other areas of the business where you may want to share resources.

As you can see, SAML authentication is a good choice as it is an easy and secure way to manage authentication across multiple enterprise domains and other resource domains. One point to mention is that you will lose control of the people picker when using this method in SharePoint. The people picker will search for and find users, but you cannot base this search on a valid user, group, or claim.

Zones are very important in a SharePoint web application configuration as they provide logical areas within a web application that separate authentication based on a web application. Within the web application, you can establish separate URLs across the zones to access the content within one web application.

You can also implement multiple authentication methods in a single zone, which gives you some different ways to create and establish authentication, depending on the method or who you want to access the zone. I have seen cases where there has been code within the site to determine what you see based on your authentication method. If you want to control an anonymous site, then you can control what content users see within the site settings of the site using this method as well.

Some other things to note are that Windows authentication and forms-based authentication are the only methods that you can only have one instance per zone. (Remember that you must have Windows authentication established on the default web application for search crawling to take place! You can also have more than one form of authentication in each zone.)

To architect a SAML token-based solution, you must create some components so that the architecture supports it, such as the following:

- SharePoint Security Token Service
- Token-signing certificate
- Identity claim
- Claims that describe users
- Realms or web application URLs
- `SPTrustedIdentityTokenIssuer`

You can use multiple user repositories in order to work within a SAML claims architecture. These all use the Security Token Service to communicate. As you will see when configuring web applications, you will be required to add an entry to establish trust with the Trusted Identity Provider area within the form. Once that has been established, the certificate will need to be copied and/or pulled into SharePoint via Central Administration so that these security validations have a verifiable handshake.

There are other configurations that may also need to take place, such as PowerShell scripting and, in some cases, hardware that supports the configuration. The following links provides help in terms of using SAML and ADFS. You can read more about the process of implementing Federated Authentication at <https://docs.microsoft.com/en-us/sharepoint/security-for-sharepoint-server/implement-saml-based-authentication-in-sharepoint-server>.

As you can see, authentication has changed a bit, but there is a way to get what you want using a third-party tool or even new Microsoft technologies. The methods provided at this link are only supported by SharePoint 2013 farms or newer. The important thing to remember is that you always want to set up for the future. I recommend a cloud-based authentication method so that even if you are thinking about moving to the cloud, it doesn't become a hassle because your cloud provider can be authenticated on-premises or in a cloud environment. It is the best way to be ready for any transitions in the future.

Understanding load balancing

Load balancing is a way of leveraging hardware or software in order to manage connections to web frontend servers in your farm, which are seen as user traffic resources. These servers, when used in two or more configurations, help provide balanced resources for user loads to support connections using the sites within a specific URL. As a MinRole Server, WFE server has redundancy based on the number of WFE MinRoles that have been deployed. Deploying these server resources in two or more server configurations brings redundancy and can support user connections effectively so that they are not overrun by user connections to the sites that are available.

With that, there are, in theory, limitations in terms of how many web applications are supported by best practices – 20 using the Traditional Web Application creation option in SharePoint. There are also bounced around limitations in terms of how many service accounts/app pools are supported, which should really be no more than 10. Each web application you add to a farm with its own application pool will add about 380 MB to the RAM that's consumed on the server it is running on. Adding a web application with a shared application pool will add about 62 MB of RAM that's consumed on the server. In the past, I tested Host Named Site Collections and each was about 2 GB and the RAM was consumed per web application, which is a lot of RAM. So, if you have enough RAM to throw at the server, you will see no performance hit on them.

When working in the field, I have seen a customer who had 34 web applications running SharePoint 2010 and had the minimum CPU and RAM on the server to support the server resources, but the sites were really slow (for obvious reasons). Once they bumped up the RAM to around 64 GB on each WFE and added some more CPU, the server resources worked fine. The sites were speedy, and things worked as they should. So, don't think that you have to have only 10 application pools. Just know that with some creative configurations, you can make this work using MinRoles, server resources, and RAM.

I am not saying that you should do this and bypass best practices because best practices are documented for a reason on Microsoft's website. You can test the waters if you want to, which I have seen others do. I am making this a recommendation but sometimes, these things do not matter, depending on the community's size and other resource factors, as stated previously. There are also configurations you can use to scale out web frontend servers so that they support web applications on individual servers. This stops unnecessary IIS sites from running on certain servers using IIS bindings and IP address assignments, which you can use to isolate traffic to the server based on the URL. This can help with minimizing the number of app pools as well because some sites will not be running. Find your sweet spot and ramp up in areas as needed.

As we mentioned previously, we have two ways of performing load balancing: using hardware load balancers or software load balancers. Next, we will see which one is best for your environment while looking at costs.

Load balancing with hardware

As you may be aware, hardware load balancers used to cost a pretty penny, but this is because they can host many different web applications. F5 is the most popular load balancer for SharePoint because its configuration works well with SharePoint configurations within the farm. Hardware load balancers run on their own and have their own processors and memory. So, there is no need to use them as part of the servers supporting our sites. They can also be configured for redundancy so that the hardware fails over.

With that comes other features that a hardware load balancer can provide, especially over the choice of using NLB as a Windows service load balancer. For one, as mentioned previously, performance would be my first concern as NLB resides on web frontends. Features such as affinity and persistence will be available in the hardware load balancer. A hardware load balancer can also provide certificate management, which can be useful in some use cases. You will also find that hardware load balancers will spread workloads across the web frontends with consistent response times. Due to these and other factors, hardware load balancers are the first choice in my book.

Load balancing with software

Software load balancers are more challenging to set up because they usually run on the servers we are using as web frontends on our farm. When performing the configuration for NLB load balancing, you will see that option works well, but the resources it consumes may not be optimal for the performance of the web frontend. There are also other things to be aware of when using NLB as this service cannot detect failures due to a service outage. It can only detect an outage by IP address. There are also other features that are not available, such as SSL offloading, compression, and caching, which are features I would say are mandatory these days. Performance is the main concern with using NLB, so please figure out the best plan for your environment.

There are other software load balancers that can be run from other servers, but I really see this as a separate managed server that brings more complexity than simply adding a hardware device. A hardware device is specific in its duty, but a server managing this type of feature is a trouble spot in my book. Anything can happen to Windows Updates, server misconfigurations, and more. The choice is yours at the end of the day.

In Azure, there are cloud software load balancers that work but since they are cloud-based, they always perform as they should separate from the web server resources. Realistically, in an on-premises environment, it's best to use a hardware load balancer. This could also be true for the cloud in a hybrid scenario.

Load balancers can play a big role in your network in terms of how the network is configured, what protocols are used to authenticate it, and other configurations we have not mentioned in this book, such as session stickiness. The thing we wanted to point out is that you should make sure you bring this to the table early and map out your process of load balancing your SharePoint sites beforehand. Test and make sure things work before going live.

Exploring SharePoint migration

Migrating content is a tough role in any organization. Overseeing getting all the data from source to destination is a challenging task, especially with SharePoint, mapped drives, and other storage resources. Users will complain about data being missing, even if it is irrelevant. They will be, in some cases, irritated or even combative because they are afraid of change.

You must plan and make sure you understand the data they use, some of their processes, and the content they are using intimately. You will also need to find out what data is relevant and what data may not be relevant before moving to the new environment. You will find this to be a daunting task when dealing with mapped drives because people do not know what the latest versions of files are in most cases; for example, some may be named FinalFinal. To make sure you're using the correct files, you must work with the customer to clean up any irrelevant files before going forward. You have lots of choices when it comes to storage locations due to SharePoint and OneDrive being available. Don't go back to mapped drives if you can avoid it, but if you do, clean up those files before moving them.

When looking at content, you must be prepared to classify and reclassify files as needed and tag them within the new environment correctly. Use of managed metadata and/or columns to describe the content is key for search results. Securing the data based on those classifications comes into play so that once they've been migrated to a document library, they can be secured. Files within the libraries can also be secured individually if needed. Breaking inheritance is also a concern at this point when you're talking to your customer because you do not want to do this a lot when you're setting up content. So, be mindful of how you set up new libraries in the new environment.

Here is a list of areas to pay attention to before migration:

- File Size
- Individual Permission
- URLs (file paths) and file names
- File sizes
- Character limitations
- Custom solutions
- Branding
- InfoPath
- Workflow state and history
- Permissions (do you have access to all the files?)
- Folders with more than 5000 items
- Unsupported site templates
- Orphaned users
- Checked out files
- Unsupported list templates
- File extensions

We must also remember that even with mapped drives, we can also migrate to OneDrive. Security and various options for folder organization will help the customer manage those files. It's not like SharePoint, but if a customer wants to implement this type of storage location, be ready to answer questions. This is contingent with if you are in a hybrid environment where you already have Microsoft 365 set up.

If you're working with SharePoint, you will also need to look at versioning settings, column types, and any updated aspects that are moving from one version of SharePoint to another. Help them understand that moving to this new location will give them more control over the data from a security aspect; waiting for an admin to update security for new and existing users within mapped drives is also possible.

This sometimes gets them excited about moving and helps them relax, which will make your users feel as though everything is going to be OK. Show them that you have investigated everything and build confidence in the migration by having meetings about this migration. You can even suggest the use of retention libraries for holding documents online either with OneDrive or SharePoint so that the customer understands there are choices when it comes to how old documents can be handled. Processes can be put in place for handling new files that need to be moved to a separate location for safe keeping as well.

As we mentioned previously, this is not an easy task. You are in the hot seat to figure out how to get 100% of your content identified from one version to the other. We will talk about some of the areas to focus on and which migration method will work for your migration scenario. I have also identified some migration tools within the method to give you a breakdown of my experiences with those tools.

We will also talk about creating schedules for your departments and testing with users as we also want to break down the use of preliminary migrations and final migration testing. If you have not, and I will say this again, create new dev and test environments to make sure you can provide areas within the environment where users can test their content and have new ways of accessing it.

As part of our environment, we should have dev, test, and production environments, which gives us a completely functional SharePoint environment. This means we have a place we can test out migrations and have the user test them too. If you do not have this development environment set up, then you should not be reading this chapter of this book. The last thing you want to do is test in your test and production environments; always do this during the development phase. If you have these environments set up, then we can move on and find out what we need to do in order to start moving content from our old farm to the new one. Make sure all your farms have been configured correctly and are the same so that the results of the tests will be the same across the board. Configuration management is important!

During migrations, you also want to make sure you put source content in read-only mode when doing final migrations so that nothing is changed during this process. There are many things you need to make sure are in place before we start this migration. Take full backups of content before the migration, as well as once you have got the content over to the new farm. This backup should be taken once you have settled all issues and confirmed that all the errors have been fixed with the customer. This helps create a baseline that acts as a safeguard from the migration of both the source and target farms.

Know your customers

Identify all the departments that are being migrated and create a list of departments and users (if possible). If you have departments that are ready to move and eager to take advantage of new technology, then work with those customers first. These departments are the ones that will be successful and will give you a chance to build a good story going forward. Make sure to interview all departments before picking and choosing a schedule as well.

The following are some example questions you should ask when performing department interviews:

- What are you currently using SharePoint for?
- How big are some of the larger files that you will be migrating?
- Is there anything you want to change in your current site?
- Do you have any automated processes?
- Do you have any custom applications?
- Are there any file shares that will be migrated?
- What do you do day-to-day with SharePoint?
- Do you have any staff that can be contacted and can help drive the migration process?
- When would you like to move?
- Do you have any immediate or future goals for the product?

The biggest thing you will encounter with this part of your project is a failure. The reason why it is more crucial at this point to succeed is that when you fail in front of IT staff, it is OK; you can recover since it's a small subset of the project. However, when you get to the migration stage, this affects the company because everyone is watching. This also brings a spotlight on why some users do not like SharePoint. Do not give them any ammunition to criticize SharePoint because it can cause issues and it's something you will have to live with for a while. Believe me, success is the goal here.

Some of the things you can do to be more in tune with your customers or department include understanding what they do. Knowing what they do and how they use SharePoint can go a long way into supporting the department during the migration process. If possible and if you have time, find out who used to work in those departments that might have data that is still valid in the source content. Knowing some of those user accounts that may not be in Active Directory now will help to troubleshoot errors going forward. Some tools that are used when migrating lists and libraries do not work well when versioning items that could have a user account specified in a people and group column because, when the item is migrated, it will fail. Make sure to account for what you can do beforehand and use the tool mapping component to map users and groups if needed. By doing this, accounts that are not there can be masked with the admin account or another account so that the item does not fail during the migration.

Find out what your customer or department needs from you. Whether it is handholding or more information for them to feel comfortable, make sure you provide it. There might be multiple questions you wish to ask, some of which are as follows:

- Are you migrating a file share or SharePoint site?
- Do you have access to the file share or SharePoint site?
- How large are the files that are being migrated?

This may add more to your workload, which is why you want to make sure you account for any scheduling hold-ups now by interviewing all departments before you finalize your schedule, as stated previously. If there is a person on the staff that would like to help or be that go-to person, find that out now so that they can be your liaison between you and the rest of the team.

Find out the immediate or future goals of the department. This is crucial so that you can get an understanding of where they would like to go with SharePoint. This also gives you the opportunity to discuss how SharePoint can help them manage data more efficiently. Having a demo ready for some of the new features within SharePoint, as discussed earlier in this book, can show you are prepared and that these features are working as they should in the new version. This gives the business analyst some information on what could be done to help them in the future. This is the time to start being proactive and not reactive with your customers. Start fresh and make this transition useful for everyone.

Migration – choosing your weapon of choice

When choosing how we migrate, we must look at the content and versions of SharePoint we are working with. Some questions that you should be asking yourself are as follows:

- What method should I use to get this task completed?
- Should I purchase a tool to perform migration?
- What are some other methods we can use to migrate content from the source to the destination?

There are a few ways to migrate content in SharePoint:

- Content database migration
- Using a migration tool
- PowerShell migration
- Manually using Windows Explorer

Let's take a look at these in more detail.

Content database migration

This is the out of the box task of moving content from one farm to another. This supports migration from version to version and cross-web applications for on-premises environments. There are technical points that need to be addressed as part of both migration paths when using this method. This provides a better capture of the site from a bigger standpoint, but it does not give you some of the more finite capabilities you may need in order to clean up content beforehand. This is best used when custom solutions are not involved, and the content is mostly out of the box.

Using a migration tool

This depends on whether you're using an external application to move content from one SharePoint site to another site. These tools can be used for either on-premises or cloud migrations. This also means we can migrate from one version of a SharePoint farm to another SharePoint farm. Using a migration tool provides us with flexibility for scheduling, picking specific content, using mapping capabilities to map columns in lists, and updating permissions on items that may be held by users who no longer work at the company, to name a few. Governance tools also come into play with tools you select as many companies provide those to help you understand your environment before migration.

One thing I do to speed up the migration process is create as many server named sites as possible to extend my web applications. This will give you many URL points of entry for content migrations so that you can use separate servers to push the content through, instead of using a DNS name where all traffic will hit one or two servers. The server resources are then separate from one another and you can have different admins pointing different tool installations to different servers. You will see no bottlenecks pushing content through as long as your SQL server can keep up with the influx of data.

Tools also allows you to make choices for other Microsoft cloud services and third-party solutions such as Google, Dropbox, and OneDrive. If you have a tool that can connect to those types of services and you want to migrate content from those repositories, this is the way to do it. A migration tool provides such integrations and can be helpful in moving these documents over to a new platform. It will also leave behind database errors found in the content, such as errors with solutions that were left behind from other versions, plus other content that may have faced errors due to database issues.

You can also use the tool in combination with content database migration and migrate your databases first, before using the tool on the weekend to push incremental changes to the content. This cuts down how long it will take you to move content save you money since with most tools, you must pay per GB. Unfortunately, you cannot use this method when moving to the cloud.

Important Note

Remember: your logging files will grow while you're completing this process, and large amounts of logging data will be created on your SQL and SharePoint servers. Make sure that all your logging services for IIS and SharePoint are pointed to the Data or Log drive on your machine and that it has a lot of space during this process!

PowerShell migration

PowerShell migration is another way we can migrate content. It is more tedious and requires you to be skilled in PowerShell. I do not recommend this method for newbies or admins who do not have this skill set already. The chances of errors occurring is high, and you do not want that when you are on a schedule. It is not time to practice PowerShell at this point.

Tip

Some examples of PowerShell being used as a migration tool can be found on Microsoft's website at <https://docs.microsoft.com/en-us/sharepointmigration/overview-spmt-ps-cmdlets>.

Manual migrations

As an example, let's say I have a folder on a server that is being used as a shared folder. This folder has documents in it that need to be migrated to a SharePoint library. I can take these files from the shared folder and copy them directly into the library using the Windows Explorer functionality within the SharePoint library. This is an easy way to migrate documents from desktops, but the limitation is that you can only copy up to 100 documents at a time. You also do not have the opportunity to add column information or metadata to these documents as they are being uploaded.

Important Note

Beware! Do not make the mistake of having a live site on a destination farm where you have not finished configuring your services. Make sure you have completed all configurations before you put any new "live" sites in your new production environment. If you need to work with some of the departments and have sites that are live while migrating, ensure your dev and test environments are set up so that you can test any migrated content before it's put into production as a live site. You can then make configuration changes there and not in production to test the farm.

There are other ways we can use manual processes to move data as well. Microsoft Office tools such as Microsoft Access and Microsoft Excel allow us to move content from one list to another or one farm to another. All lists are basically Excel and Access databases. So, capturing columns and pulling data back into another list is fairly straightforward using PowerShell and even just Access itself. Look around and see what you can find. In some instances, this may work when you are just moving small items or concentrating on one document library and don't want to purchase something, or you don't want users bothering the admin when it comes to moving the list through Central Administration.

The Central Administration tool, which can be used to export lists and libraries, can be seen in the following screenshot:

Site Or List Export ⓘ

Readiness
 No export is in progress.

Site Collection
 Select a site or list to export. First select the site collection that contains the site, then select a site to export. To export a list, select the site collection and site that contain it, and then select the list.

Site Collection: <http://spmysites.xyzinc.local> ▾
 Site: [No selection](#) ▾
 List: [No selection](#) ▾

File location:
 Specify the destination for the export package.

Filename:
☐ Overwrite existing files
 Example: \\backup\SharePoint\export.cmp

☐ Export full security

Export Full Security
 Export full security of the site, including author, editors, created by times, and modified by times. This also includes all users in the sites.

Export Versions
 Select the version history information to include for files and list items. You can include all versions, the last major version, the current version, or the last major and last minor versions.

Export versions
 ▾

Figure 7.13 – Exporting a site or list

As you can see, there are many ways to migrate content from SharePoint. Using the tools that work for your situation is the name of the game. Do not just take someone else's word for it. Some tools work better for some people than others. It's all about what you want, not how expensive or popular a solution is. Even within SharePoint, I can pull content from top-level areas and import them. In some cases, this would not work, while in others, it could be the best solution to use. Just make sure it works for you and your requirements.

Now that we have talked about the different ways we can perform migrations, next, we will learn about the types of migrations that can be achieved.

Types of migration

In this section, we will cover different types of migration. This will provide you with a use case to follow once you start the migration process. The types of migration that can be achieved are as follows:

- Version to version
- Server to server
- Service to service

- Cross-web applications
- Cloud migrations from on-premises
- Third-party to on-premises and cloud
- Files shares

Version to version: A version-to-version migration is when you migrate from a SharePoint 2013 farm to a SharePoint 2019 farm. However, as part of that migration, you need to validate your content through the in-between version of SharePoint – in this case, SharePoint 2016. This also needs to be a content database migration method.

Server to server: Server-to-server migrations can be easy or become very complex, depending on the way the content was structured in SharePoint. Server-to-server migrations could be when you migrate from one cloud to another cloud where you have the same version of SharePoint, or it could be when you need to upgrade the server platform from Windows Server 2012 R2 to Windows 2016 Server for licensing reasons, supportability, or just to keep your servers up to date with the latest and greatest server technology. If you are migrating from SharePoint 2007 to SharePoint 2019 using the content database migration method, this could be considered a server-to-server migration as well because when lifting content from 2007, you have to take it through the different versions of SharePoint to get the content to 2019.

When moving through 2010, 2013, and 2016, each server would have to be set up and configured to support the migration. There is also a step in the 2010 migration that will upgrade your workflows and InfoPath forms during the process, and there's a tool to migrate you to 2019 from that point. You would have to manually migrate the business data catalog (BCS in 2019) from 2007 to 2010, for which you can refer to [https://docs.microsoft.com/en-us/previous-versions/office/developer/sharepoint-2010/ff817559\(v=office.14\)](https://docs.microsoft.com/en-us/previous-versions/office/developer/sharepoint-2010/ff817559(v=office.14)). After that, the services database could be moved through this process as well to keep those services intact as you move through the migration. You will also need to migrate classic users to claims, which occurs during the migration from 2007 to 2010. For more information on migrating from classic-mode to claims-based authentication in SharePoint 2013, refer to <https://docs.microsoft.com/en-us/sharepoint/upgrade-and-update/migrate-from-classic-mode-to-claims-based-authentication-in-sharepoint-2013>.

Service to service: These migrations can be complex. I was recently on a migration from Rackspace to AWS and it was challenging due to the size of the content databases that we had to work with. Getting such databases transferred to a new service is tough, especially when you have small maintenance windows. The one thing to watch out for is the size, but also what type of web application configuration you choose.

Say, for instance, you chose Path-Based Web Applications as your standard application. Now, in terms of migration, all content needs to be migrated all at once, regardless of how many databases you have in that web application. If you do not move all the content databases at once, your users will have no way of getting to the content because there is no way to split the URL so that it talks to two separate farms.

However, you can migrate Host Named Site Collections one at a time or all at once. This is because the Host Name is the key to getting to the content, and it is associated with the site collection and not the web application. This is great when it comes to these types of situations where content can be very hard to move to another service or farm. Plan accordingly so that you do not get caught in a situation like this, especially when you're managing the sizes of your content databases.

Cross-web applications (internal farm): These migrations also happen during the production use of a SharePoint farm. You need to understand how or why you need to use any other migration methods mentioned at the beginning of this section. The approach you should use for list and library migrations would be to use a tool or use the area within Central Administration to extract the site, list, or library and then move the content from one site to another. Some tweaks may be involved here, but this is something you should explore, depending on your requirements.

Migration to the cloud: This can only be achieved using a tool or a very time-consuming manual method. Of course, a tool is preferred in this scenario due to the amount of time you would have to spend going through files and uploading them to SharePoint Online. The manual process would be to download all files to a local system and then upload them back into the new farm libraries. This would mean reapplying all permissions, as well as losing version history. We can see why a tool is very important when migrating to the cloud. Most tools charge you per GB, so please budget for this!

I remember migrating from DocuShare a few years ago and the only tool available was the command line. During that process, you could export all the files, but a lot of information was lost. At the time of writing, there are lots of command-line tools, such as JSOM, that can help define these files and permissions. They are exported in a flat file structure to help pull that information into SharePoint and apply some metadata from the old system, which in some cases is not SharePoint.

You can also migrate many different types of information using tools to SharePoint or OneDrive. Some tools give you different capabilities with different applications. Some connect to Google Docs, Dropbox, and even some other applications. I have seen with some tools, such as Saketa, offer Microsoft Teams migrations as part of their tool set.

Microsoft also has a free tool that can be used to perform migrations from an on-premises environment to the cloud. I have only used this tool once and it works as it should. However, at the time, it didn't have a lot of bells and whistles compared to what other tools offer. I believe they have made updates to this tool, so if you are looking for one, try it and see if it will work for your project.

Important Note

Microsoft has its own migration tool that only migrates to the cloud. You can find more information at <https://docs.microsoft.com/en-us/sharepointmigration/introducing-the-sharepoint-migration-tool>.

File shares: File shares are always forgotten, but the return on investment in migrating these files to SharePoint is huge. When we leave these files shared on servers, you are requiring these files to be hosted by one or many servers with extended storage space. These servers cost you money to run and always require disk space upgrades. Instead, pull these files into SharePoint and use the databases for sharing and managing these files.

OneDrive can also be used to hold personal files and get rid of MySites and the storage comes for free with your plan. The SharePoint 2019 Server must be set up to use a hybrid connection to the cloud, which we talk about in *Chapter 10, SharePoint Advanced Reporting and Features*.

The users win as well because they gain functionality when using SharePoint, and your help desk will love you for it. With this, you have the benefit of versioning and much more control over your files. You can also place the files into segregated site collections/document libraries so that there will be no slips in security, unlike file shares. They will also not be calling the help desk to add users to certain folders, which will cut down administration use as well. Users can also use files for workflow processes, versioning, and other collaborative means. They can include these files in links throughout sites in order to share information using the latest version of the file via Manage Copies.

Migration tools

Most tools run on any OS platform and provide a lot of options when it comes to migrating using mappings, PowerShell, and scheduling. My experience with ShareGate has been great, but it does not offer an array of solutions as it seems to concentrate on the migration and governance space. As far as the tool goes, it is great and provides everything you need to prepare for a smooth migration process. I have not had many issues using the product, and I would say that it is first class!

ShareGate has been the tool of choice for my migrations. I really like both ShareGate and Saketa. Unlike other tools in this space, ShareGate gives you a great desktop and many functionalities you will not see in other tools. The tool is inexpensive and runs on any Windows platform. Again, pricing is tiered, so you can find a comfortable spot that fits your budget based on your data requirements.

Important Note

If you are performing an on-premises migration, make sure to try out content database migrations first. This will save you money in the long run. You can then use ShareGate to push the deltas needed to finalize the updates to the user's content when performing on-premises migrations.

Some of the features of ShareGate are as follows:

- Auto-generates PowerShell scripts for all types of migrations with copy options.
- You can pre-test your migration to figure out errors before performing a real-time migration.
- Governance reporting features for pinpointing issues with governance.
- Gives you the option to import user and group mappings from Excel files.
- ShareGate Shell can be used to migrate on schedules and allows you to use PowerShell within the tool.
- Advanced options for managing more complex migration strategies.
- Provides a connection manager for performing SharePoint and OneDrive migrations.
- Performance improves when using Insane Mode for migrations.
- General bug fixes and updates are provided regularly.
- Easy to use.

The following is a list of some of the tools that can be used for SharePoint migration:

Tool	Comments	Review
AvePoint	Has an arsenal of solutions for SharePoint On-Premises and Office 365 for migration, governance, backup, RBS, and many others.	Very good support and works as described in most cases. Setup for products can be confusing but once you get it, you'll be fine. Uses agents instead of solutions on the farm which keeps your environment free of application solutions. Lots of bells and whistles and highly recommended on-premise and in the cloud. The only downfall for me is it requires servers to be added to an on-premise farm to function, which can lead to a bigger server footprint on your network which is more cost. Also, it can be a little pricy but is your farm worth it? Yes!
ShareGate	This solution provides reporting, migration, and governance.	For the money, this is one of the best tools on the market for the areas of focus the tool works for. The only downfall I have seen is it can be confusing for some users who do not have a lot of experience with SharePoint. Other than that, if you want governance, reporting and migration tools this is the tool I would use for that purpose.
Metalogix	The company is out of business but was purchased by Dell. A long-time player in the migration and solution business for SharePoint.	Metalogix, although out of business, has been purchased and we should see some new things happening with the product under a rebranded title. In my experience it has not been the best experience with this product. Best experience with this product. I will say early on I had the opportunity to use it when it was first created for Blob management. It worked great and I was impressed but as they moved on with new solutions things became a little more concerning. I would thoroughly test first before moving forward and make sure you have a great sales rep who can get you great support when you need it.
Saketa	A new player in the SharePoint Migration space.	The interface of this product is like no other. I love the speed of the product during migration as in testing this product pushed content faster than others tested. Great pricing for different tiers of migration unlike other tools on the market. Other integrations are included as well for Microsoft Teams migration.

Figure 7.14 – Tools that can be used for SharePoint migration

AvePoint also has a new migration tool called Fly that does not require any server resources. This really changed the game for the company's migration offering from my perspective. It can be installed free of charge from the AvePoints enterprise application interface and is similar to portable applications such as ShareGate. The product is great! I have tested it, but not with a lot of data. Please check this tool out for your next migration and tell them I sent you! Metalogix has been a key player in SharePoint since I can remember. I wrote up some of this information a while back with the first release of the product, and want to make sure you understand that you definitely need to try this product. Although I had a bad experience with it, I have heard good things about the tool now and the features are very impressive. The downside to it is that it is not very user friendly, like ShareGate or other tools, so there is a learning curve. This tool, despite its improvement, does not support PowerShell integration. I just wanted to update you on this tool to make it clear that you should try it.

Microsoft also has a free migration tool that allows you to migrate to Microsoft 365 from SharePoint On-Premises platforms, including 2016, 2013 including Foundation, and 2010 including Foundation. It also includes hooks for connecting to network and local file shares. To find out more about this tool, please go to <https://docs.microsoft.com/en-us/sharepointmigration/introducing-the-sharepoint-migration-tool>.

If you are looking for a planning and assessment tool, Microsoft provides the **SharePoint Migration Assessment Tool (SMAT)**, a command-line tool that scans SharePoint farms to identify issues before you migrate. This will give you a report so that you can go back and fix any issues before migration. This tool can also be found in the preceding link.

Managed metadata: This is a more complex migration. Some of the migration tools that are available allow you to migrate metadata using the methods provided by the tool. The issue with managed metadata is that there is a GUID for each term set, and the term within the service will not change if you migrate the data. So, if you are doing a service and content database migration, this method of migrating the databases works because there is no GUID change. If you cannot get these methods working and you must do a new installation, you will have to recreate the service and the terms within it.

When performing a content database migration, these details for the managed metadata can be brought over by backing up and restoring the managed metadata service database. When you're creating your managed metadata service, you will use that restored backup to create the new service on the new farm. If you are using a content type hub, update that link using the following PowerShell script:

```
Set-SPMetadataServiceApplication -Identity "Managed metadata  
Service Application" -HubURI "http://sitename/contenttypehub"
```

If this is not the method you would like to use to restore the service database, you can use the export-import method. When you migrate the service in this way, you will have to create the service first and then import the information using Excel. You can do that using the following PowerShell script:

```
Add-PSSnapin Microsoft.SharePoint.Powershell $metadataApp= Get-  
SpServiceApplication | ? {$_.TypeName -eq "Managed metadata  
Service"} $mmsAppId = $metadataApp.Id $mmsproxy = Get-  
SPServiceApplicationProxy | ?{$_.TypeName -eq "Managed metadata  
Service Connection"} Export-SPMetadataWebServicePartitionData  
-Identity $mmsAppId -ServiceProxy $mmsproxy -Path "C:\MMD.cab"
```

Important Note

Make sure you do not have any duplicates in your file before moving forward. If you have duplicates, the process will error on import.

The script for importing is as follows:

```
Add-PSSnapin Microsoft.SharePoint.Powershell $metadataApp=
Get-SpServiceApplication | ? {$_.TypeName -eq "Managed
metadata Service"} $mmsAppId = $metadataApp.Id $mmsproxy =
Get-SPServiceApplicationProxy | ?{$_.TypeName -eq "Managed
metadata Service Connection"} Import-SPMetadataWebServiceParti
tionData -Identity $mmsAppId -ServiceProxy $mmsproxy -Path "//
SharedPath/MMD.cab"
```

Remember that if you were using managed metadata previously in your farm, then you need to migrate this service database and create a service application first before migrating any content. The content, when migrated, will find out whether this data is available so that it can populate the data in the fields that use metadata columns. In some cases, it may give you the functionality to migrate this metadata, depending on the tool you are using. When performing content database migrations, you will have to move the metadata first.

You also need to check that there is a content type hub in your past farm. If so, you will want to make sure you configure that in the new SharePoint 2019 farm. You can do this by setting up a new site collection solely for this purpose and adding the URL to the Content Type Hub form field when editing your Managed metadata Service application. You can also update the Content Type Hub using PowerShell, as shown in the preceding script, to create the service application. If you have already created it without it, use this script:

```
Set-SPMetadataServiceApplication -Identity <MMSAppName> -HubURI
<ContentTypeHub>
```

As you can see, there is a sequence you must follow when performing migrations, and scheduling is a big part of this process. Next, we will learn how and when to schedule migrations.

Scheduling migrations

At this point, everyone knows they are moving to the new SharePoint environment. Everyone is on edge to do this because, at the end of the day, most are afraid of change. So, how do we schedule migrations? My take on this is that you start with the departments that are most eager to jump in. The reason you want to do this is that you will get the most help with the process from resources within the department. This creates a team effort that you might not get from another department, which could defeat the migration before it starts.

If you don't have any eager departments, which I doubt you will, take one department that you have some camaraderie with or one of the hardest you will have to move due to complexity and test their migration first. You can at least test migration with this first department and have the users test the migrated content and compare it between the source and the destination. You should be able to give them an error report from any migration type and work with them on how you will mitigate the errors when performing the final migration of the content.

In the *Types of migration* section, we discussed that migration tools have some scheduling automation capabilities that you can use to configure a migration and create a scheduled task when a particular content migration should run. You can also migrate using PowerShell by scheduling a command to execute on the server at a certain time, but most tools have this integrated with the product.

When running scheduled migrations, you do not have to be present. You could migrate several departments at a time if the content size is reasonable. This also depends on what your time frame is because you want to make sure your users have access to the content you're migrating, maybe the next morning or after the weekend on Monday morning.

You will need to support the migration from time to time to monitor the progress of the migrations you are scheduling. Believe me, there are always errors. To help with such errors, you may need to assign tasks to people in your department to help monitor their progress. If you have tested your migrations and are pretty sure you have done the testing well or if you know there is not much complexity in the site you're migrating, then you may be able to let the scheduled migration run on its own.

If you were testing and used the most difficult customer based on the complexity of the content, then this would have given you a realistic look at the tool and any errors that come up, based on this content. Always take this on with all resources on the ground. If it is just you, get support from Microsoft, a third-party company, or from the company that owns the tools you purchased. This can be done successfully if you plan out the migration properly and identify any errors and mitigate them prior in a test migration.

Again, this may take a couple of test migrations, but the mitigation of errors that surface is the key to success and how quickly you can turn them around. Make sure you always account for the time you may have to spend on the backend recreating content in a site. Again, if the solution is not available in the next version of the farm, you have to make sure you recreate it using a new tool and communicate the difficulty and/or discontinuation of the product to the customer.

Important Note

If you have a couple or even a few web applications, NEVER EVER migrate one web application if the services on the new farm are not stable. If you are still in configuration mode and making updates to services, DO NOT migrate anyone to that unstable farm. Once you have a stable service platform and you have tested those services, you can migrate your first set of user content.

Success is the best way to build confidence in the company as you make these migrations. Choose the right department to work with and test your migration. Review your errors and figure out how to fix them before the final migrations. This may take another test migration, but do not let the first migration fail. Do your best to be successful and have the department that is using the new environment brag about how easy it was to migrate so that others will be at ease and want to move immediately.

In the next section, we will look at farm solutions. They play a big part in recreating content in sites. You may have some issues with this, depending on whether you chose a customized or third-party solution.

Exploring farm solutions

Have you identified all the third-party solutions in your current environment that will be migrated to the new environment? Have you checked the GAC? Have you identified new third-party solutions you would like to use or have replace old solutions? Be sure you check this location within your servers to make sure you have not missed anything. This happened mainly in the 2007 and 2010 days when some solutions were not deployed through SharePoint so that they could be seen and documented. So, if you are coming from one of the older versions of SharePoint, please make sure to check the GAC, which can be found in the `Assemblies` folder in `C:\Windows`, for any solutions that have been deployed using this method.

If you have a good list of solutions from third-party vendors, then you are in business. You can take that list of solutions and find out if the company has upgrades for SharePoint Server 2019. If they do have the solutions, which may have changed to the new SharePoint Add-In model, then download and activate them in the new environment. Test them with your content or have your users test them to make sure they work as expected. Ask your third-party vendor questions and gather information about how they test the migration process from older versions of SharePoint. They should supply documentation about how their solutions can be migrated to the new farm. Again, your testing is important as well, so do not discount testing this for yourself once you have the necessary information.

If the company is no longer in business or has discontinued the solution, have we found a new one to replace it? What can we do to find a solution to replace it with? Well, the first thing we can do is find out what the solution does. There could be another company that has a similar solution you can replace it with. The issues you will encounter will be from a content perspective and will depend on how that content was captured within this solution. You may have to rebuild the content within the solution in the new environment. This will have to be accounted for on the backend of the migration as time spent to do this process. Going into this in detail is beyond the scope of this book, but identify the content and how it is presented and try to do the same in the new environment using the new solution.

Test your third-party solution as well, especially any new solutions you may purchase. You want to make sure it works as it should. Document how the users can use it by coming up with use cases and showcasing them in a demo or in a PowerPoint. As always, keeping communication with your users active is the most important thing you can do during this time. The more you can communicate good and bad things, the better off you will be.

We should also be moving away from the Farm Solution model for custom solutions. There is a new model available in SharePoint 2019. This new model is called the SharePoint Add-In Model and it allows us to get away from Farm Solutions. It helps with migrating solutions to the cloud later. This requires transforming your farm solutions into SharePoint Add-in Model solutions. This would involve doing the following:

- Analyzing your existing extensions
- Designing and developing your new SharePoint add-in
- Testing and deploying your add-in
- Deploying your add-in to the production environment

Note

To deploy newly created custom web parts, you must create an App Catalog. Please review *Chapter 12, SharePoint Framework*, and follow the instructions provided to set up an environment for developers.

The biggest thing to be aware of while doing a process like this is downtime and how this will impact your business. If the solutions you are transforming are key to the business, then you will need to be very careful of how you implement this change. You want to make sure your users are aware of this and also understand you are making this change. You can also run Farm Solutions and Add-Ins in parallel. The time needed to complete or even plan would be great to show the user community so that they have documentation of what is going to happen.

There are two ways we can deploy the new add-in to the farm. One is to do this in-place, which is where you deploy the add-in and then, after making sure the site is using the SharePoint Add-In, you can retract the feature.

The other way you can deploy during a cutover would be to swing content, which extracts the content from the existing site collection where the farm solutions are currently deployed. Migrate the content to a new site collection that uses the new SharePoint Add-In that has been configured.

There are advantages and disadvantages to using either of these migrations strategies, but the big thing is to find out what you believe will work for you, test it, and then implement that process during your migration. Farm Solutions can also be tricky, so I believe the cleanest model is Swing Content. This is because I have seen cases where farm solutions get errors once they've been retracted and it takes time to figure out how to get the solution removed from the farm. This would be a terrible thing to happen, but it has happened to me many times. So, we can't get too comfortable. It's always best to build on clean environments.

There is also a process we need to follow to look into the site in general. This is because some of the elements of farm solutions interface with the users in a page. We should do the following to ensure we have done everything to replace our solutions properly:

- Check custom page layouts and master pages
- Replace web parts and controls in the UI
- Implement page manipulation
- Check for created site columns, list definitions, and content types
- Check for customized modules and feature frameworks
- Determine any custom timer jobs

There are steps you can follow to work through this list of UI-related items related to Farm Solutions. Please research those areas to figure out what you need to do to complete this process of moving toward a cloud ready, on-premises platform. Remember to use a naming convention for the new solutions and features you may migrate to the new farm.

Developed custom solutions

Not all companies use developers to build custom solutions. If you have and those developers have left the building, then you will need to either hire a developer to help you recode the custom solutions you have in your current farm for migration, use third-party solution, or find a different way to build the solution out of the box. We will talk about development frameworks in *Chapter 12, SharePoint Framework*, so that developers understand what tools are available in SharePoint Server 2019. There could also be a third-party solution that could be close to functioning as the current custom solution, which you may want to investigate.

Custom solutions really bring a different level of support to your organization's SharePoint farm. If you do not have a development team on-site, I would suggest that you do not build any custom solutions into your environment unless you have full confidence you can support them. This is where many environments fail due to the company not having the money to support efforts for developers to be on-site, or have a development team that has a high turnover where the developer with the appropriate knowledge has left the company.

In both situations, you need to be forward-thinking. As a company, set aside money to support the developed product. Have someone you can call on speed dial that understands the code and can come in and look at it if something goes wrong. Do not wait until the last minute to try and find someone. It is going to take time for them to review the documentation (if you have it), code, and any errors that may be on the server. SharePoint logs will need to be reviewed as well so that the developer has an understanding of what is happening, which could keep your environment down for days. Having a developer looking at these things prior before anything happens is a best practice so that they can review the code and get familiar with what the solution does before anything goes wrong. At this point, they may see where it may fail and may have some suggestions on updating it right away to make your solutions better.

If you have a development team that has a high turnover rate, make sure that all developers are reviewing each other's code. As part of Sprints or developer processes, they should be doing this anyway as there should be code distributed to a Code Source Safe. It could be the Team Foundation Server or other products, but someone must oversee pushing the code to other environments and testing. Having one person do that and rotating a schedule around this process helps developers understand code that has been created by other developers. Upon doing this, we can go back and see very what happened if we come across any errors. Having a high turnover rate does not help the team, so try to figure out what is happening with the team as well. Whatever it is, try and stabilize the team and keep your developers in the long term, especially if you're using a lot of custom solutions that need support.

Carrying out testing

Have you created your dev, test, and production environments? If you have not, this is where you should stop and do this. Do not move on without having these environments in place. These environments help you mitigate errors, especially when you're performing custom development. They also help with maintenance and testing product updates, as well as other updates you may have based on third-party solutions.

Stress and performance testing the environment

Performance and stress testing is a great way to figure out if your farm is suitable for the user community you're building it for. Visual Studio Enterprise Edition is the ultimate product for load testing SharePoint sites. Unfortunately, this feature will be deprecated but there is a new online version of the product that we will talk about in *Chapter 9, Managing Performance and Troubleshooting*. Within this product, there are two features called Web Performance and Load Testing Tools that can be installed using the Visual Studio Installer. You can choose from cloud-based testing to on-premises load testing. I have used this tool in the past for a couple of my clients that wanted to perform reporting before going live and the results were great. This process also performance tests your servers and you will get performance reports from the servers as part of the testing process. If you need a good tool to test your resources and ramp up user stress against the environment, this is the tool to use. Unfortunately, we will not go into this testing in-depth as this would take a whole chapter, but if you are interested in performing load tests on your environment, please take a look at the following link, which tells you how to set up and use the product: <https://docs.microsoft.com/en-us/visualstudio/test/quickstart-create-a-load-test-project?view=vs-2017>.

User testing

One of the best tools for testing workstations or desktops for troubleshooting errors in your environment is Fiddler. Fiddler will interface with the network card to show you how the device is connecting to SharePoint. It will also give you error messages if something is not working correctly from a protocol/port perspective. This is one of the best tools I have seen on the market because of how thorough the tool is with reporting, but also how easy it is to install and run.

Workstation configurations with DHCP are something to also remember. The user's workstations must be configured with the proper network configuration to reach the SharePoint site. If you are using DHCP, take a look at what has been configured for the user's workstations and make sure it is correct. The last thing you want is a user that is unable to work due to a misconfigured workstation.

Mobile devices work well with SharePoint as well. As you already know, SharePoint can be rendered from a mobile device. You want to make sure you have configured the sites so that the mobile view is activated when it is being used for that feature. This will be activated by default, but you want to check these views if you have more than one administrator to make sure it is still active.

User testing should be documented and there should be some type of testing script for the users to follow. This is generally a walkthrough SharePoint functionality that ensures the site is working as it should. It can also look at the department's workload.

As an example, you may wish to upload documents, but there are other tasks that make sense to test as well. Uploading different types of documents would be a great test. This would mean uploading the most popular document types, such as .docx, .pdf, .xlsx, and others. This ensures everything on the farm, as far as uploads are concerned, is working properly.

So, as part of your testing, you could go a step further and try uploading documents you do not want to capture as part of SharePoint libraries. This means that if you have a stipulation where access documents should not be uploaded to SharePoint and you have set the blocked file type, then you want to test this as part of your testing process.

Make sure you step through all the SharePoint default testing steps, as well as the user's department steps, to create your test plan. This also gets users more acquainted with the new SharePoint look and feel and the changes that have been made to the new UI. In *Chapter 5, Farm and Services*, I listed all the areas that should be focused on when it comes to user testing.

Performing the final checks

As we mentioned previously, this is our final chance to look over our sites, content, migrations, server configurations, and any forgotten steps or services. Please make sure you look over your server resources. There are many things to account for from a server perspective, as well as a SQL and SharePoint perspective, that need to line up to give us a well-balanced baseline that supports our environment.

Server resources and configuration

Server performance is one of the biggest hidden issues I have seen in the field. It is not obvious all the time because not many admins really dig deep to see how a server is performing, nor are they even aware that the system is having issues based on a SQL Server and SharePoint-related service. As admins, we need to be aware of those areas where the server can be in bad shape and do something about it.

Important Note

Run `Get-SPPProduct -local` on each of your machines on the farm. This command ensures the updated version on your server is currently in the database.

So, to sanity check and solidify our environment as part of testing, we are going to do some server configuration reviews. We have already done a stress test and user testing. You should take this seriously and review what you have learned from the stress tests to see where your servers are falling short. I have a list of performance monitoring parameters we can monitor that can be downloaded from this book's GitHub repository.

Take those performance areas and run performance monitoring on them while testing the system until you have fine-tuned all your server resources. Yes, there are Microsoft best practices for minimum server configurations for resources, but as you know, things can be incorrect in our configuration as well. In this chapter, we're looking at those areas and fine-tuning our environment to make our server resources as responsive as possible. We will look at performance monitoring in more detail in the chapters to follow.

Application creep

Sometimes, in the world of IT, we make a mistake by adding too many applications to a server or database server and do not even realize it. One of the biggest no-nos you can do in SharePoint is add another database from another application to a SQL Server that supports SharePoint. This is a well-known best practice and should not be taken lightly.

In my experience, I have had two different scenarios occur with applications:

- Non SharePoint Database additions being made to a SQL Server instance that supports SharePoint
- Custom applications being developed that overran server resources at given times of the day

This is not to say there are not more scenarios out there that fall into this category. What I learned from these scenarios is the following:

- Database additions from other applications can kill SQL Server performance. You could run every day with no issue but once there is a problem with that application, you have problems with SharePoint. When a database being used by another application is running on a SQL Server supporting SharePoint, depending on how much that application is used in the environment, that application can slow down the performance of your SharePoint Server.
- We must look at one of the best practices for SharePoint, which is MAXDOP. MAXDOP set to 1 is not a usual setting to use for other applications. So, when adding a database that will not run well on a database server with that setting, you are just compounding problems. Make sure you have no other outside application databases running on the SQL Server you're using that supports SharePoint.

In our configuration, we also need to make sure we have selected the proper servers that support our integrations, such as SQL Reporting Services and other BI applications. In most cases, you want to justify having servers that support just these services. Even PWA and Search need to be evaluated for this isolation. This all depends on the size of your user community and how many users are using the service.

Another item to be aware of is stress testing custom developed solutions. When I worked at Microsoft as a PFE, I had a customer at a bank where they were having issues with a process every afternoon. Everyone using SharePoint would complain about slow performance and the system would just slow down dramatically. I witnessed this firsthand the first day I accessed the customer's site. That evening, I set up performance monitoring on all the servers and the next day, we captured data from the incident.

After reviewing the results, it came down to a custom application that had been developed in house to reconcile some list data that had been captured during the day. The process was very resource-intensive and just slowed everything down. The reason why this happened every day is because they performed this reconciliation every day at the same time when the company closed at 3 p.m. So, from 3 p.m. to 5 p.m. SharePoint was dead due to this custom application.

So, make sure you check all your servers at this time and make sure there are no excess applications, databases, or processes that are running that are unnecessary or located on the SharePoint Servers that do not need to be. This also goes for system supported applications such as antivirus and other server applications required by your IT management team. You must make the judgment call on these applications, but know that some can destroy the performance of your server.

NIC settings

Network Interface Cards (NICs) can also be a bottleneck. NICs have many parameters and we need to make sure we set our network interfaces properly:

- Updating your NIC firmware and drivers is critical if you wish to support the server. Please make sure you are on the latest version of the firmware and drivers on all your NICs.
- NIC teaming can affect the performance of the server on the network if it's not been configured properly. Make sure you confirm your configurations during your server testing.
- Next, we will look at MinRoles and service compliance.

MinRoles and service compliance

Assigning MinRoles to servers is the best thing that has happened with the introduction of this component in SharePoint Server 2016. MinRoles have done so much to help admins manage services and make sure they are not running services on servers that are not in line with the server's role and the design of the farm. The following screenshot shows a list of services running on the APP1 server. You can also see that this server is running a custom role. So, when testing compliance, try updating the role and adding a non-compliant service to it so that you can see how these compliance tools work.

Services on Server lists all the services based on the MinRole type:

Services on Server ⓘ

Server: SP2019-APP1 ▾ Role: Custom View: Configurable ▾			
Service	Status	Compliant	Action
Access Database Service 2010	Stopped		Start
Access Services	Stopped		Start
App Management Service	Stopped		Start
Business Data Connectivity Service	Started		Stop
Central Administration	Started		Stop
Claims to Windows Token Service	Stopped		Start
Distributed Cache	Started		Stop
Document Conversions Launcher Service	Stopped		Start
Document Conversions Load Balancer Service	Stopped		Start
Lotus Notes Connector	Stopped		Start
Machine Translation Service	Started		Stop
Managed Metadata Web Service	Started		Stop
Microsoft SharePoint Foundation Incoming E-Mail	Started		Stop
Microsoft SharePoint Foundation Sandboxed Code Service	Stopped		Start
Microsoft SharePoint Foundation Subscription Settings Service	Stopped		Start
Microsoft SharePoint Foundation Workflow Timer Service	Started		Stop
PerformancePoint Service	Stopped		Start

Figure 7.15 – Services on Server – Central Administration

You can click the **Server** drop-down and change the server you want to view within **Central Administration**.

Services in Farm shows the services and if they are disabled or enabled:

Services in Farm

View: [Configurable](#) ▾

Service	Auto Provision	Action	Compliant
Access Services	No	Manage Service Application	✓ Yes
Access Services 2010	No	Manage Service Application	✓ Yes
App Management Service	No	Manage Service Application	✓ Yes
Business Data Connectivity Service	Yes	Manage Service Application	✓ Yes
Claims to Windows Token Service	No	Enable Auto Provision	✓ Yes
Distributed Cache	Yes	Disable Auto Provision	✓ Yes
Document Conversions Launcher Service	No	Enable Auto Provision	✓ Yes
Document Conversions Load Balancer Service	No	Enable Auto Provision	✓ Yes
Machine Translation Service	Yes	Manage Service Application	✓ Yes
Managed Metadata Web Service	Yes	Manage Service Application	✓ Yes
Microsoft SharePoint Foundation Incoming E-Mail	Yes	Disable Auto Provision	✓ Yes
Microsoft SharePoint Foundation Sandboxed Code Service	No	Enable Auto Provision	✓ Yes
Microsoft SharePoint Foundation Subscription Settings Service	No	Enable Auto Provision	✓ Yes
Microsoft SharePoint Foundation Workflow Timer Service	Yes	Disable Auto Provision	✓ Yes
PerformancePoint Service	No	Manage Service Application	✓ Yes
Project Server Application Service	No	Manage Service Application	✓ Yes

Figure 7.16 – Services in Farm

If the service has not been provisioned, it will show you a link to click to create the service application.

Outgoing mail configuration

The **E-Mail** setting is usually one of the first things I configure. However, I have saved it for last as this service has changed from older versions of SharePoint. You can now do so much more within the configuration since the component can run as a TLS service using connection encryption. You can even change the port you want this service to run on. You can also assign a username and password to the connection, which you could not do in prior versions of SharePoint (excluding 2016). This brings a different level of security to the email traffic that comes from a SharePoint server, from administration messages to workflow messaging.

If you have been using SharePoint Server for a while through different versions over the years, you will have seen that the **Outgoing E-Mail Settings** page has changed significantly:

Outgoing E-Mail Settings

Warning: This page is not encrypted for secure communication. User names, passwords, and any other information will be sent in clear text. For more information, contact your administrator.

Mail Settings

Specify the SMTP mail server to use for Microsoft SharePoint Foundation e-mail-based notifications for alerts, invitations, and administrator notifications. Personalize the **From address** and **Reply-to address**.

Outbound SMTP server:

Outbound SMTP server port:

From address:

Reply-to address:

Character set:

Mail Security

Specify the authentication credentials Microsoft SharePoint Foundation will use to connect to the SMTP mail server. If the SMTP mail server doesn't require authentication, select **Anonymous**.

Note: You must set an application credential key on each server in the farm before specifying credentials. [Learn about configuring e-mail settings.](#)

Set **Use TLS connection encryption** to Yes to require Microsoft SharePoint Foundation to establish an encrypted connection to the SMTP mail server before sending e-mail. If this is set to Yes and an encrypted connection can't be established, no e-mails will be sent.

SMTP server authentication:

- ☒ Anonymous
☐ Authenticated

User name

Password

Use TLS connection encryption:

- ☒ Yes ☐ No

Figure 7.17 – Outgoing E-Mail Settings

Figure out the best configuration for your environment. If security is a concern, there are options for that within SharePoint Server 2019. If you want to use PowerShell to create the configuration for outgoing mail, use the following commands:

#Set Outgoing Mail:

```
$ca = Get-SPWebApplication -IncludeCentralAdministration |
?{$_.ISAdministrationWebApplication -eq $true}
$sendAd = "SPSMessage@xyzinc.com"
$replyAd = "SPSMessage@xyzinc.com"
$smtpSvr = "mail.xyzinc.com"
$ca.UpdateMailsettings($smtpServer, $senderAddr, $replyAddr,
65001, $true, 587)
```

#To Test Outgoing Mail:

```
Add-PSSnapin Microsoft.SharePoint.PowerShell -ErrorAction
SilentlyContinue
```

#Parameters

```
$EmailTo = "yourname@company.com"
$EmailSubject = "Test Email from your company SharePoint Farm"
```

```

$EmailBody = "Test Email Body"

#Get the outgoing Email Server settings:
$SPGlobalAdmin = New-Object Microsoft.SharePoint.
Administration.SPGlobalAdmin
$SMTPServer = $SPGlobalAdmin.OutboundSmtpServer
$EmailFrom = $SPGlobalAdmin.MailFromAddress

#Send-Mail Message:
Send-MailMessage -To $EmailTo -From $EmailFrom -Subject
$EmailSubject -Body $EmailBody -BodyAsHtml -SmtpServer
$SmtpServer

```

Be careful when you're configuring your environment. Just because you set these values using the GUI or PowerShell does not mean they work. There may be some middle configurations with Exchange or other SMTP servers that will need to be completed before this works correctly. Test all incoming and outgoing mail configurations and the functionality within lists and libraries. Notifications for alerts should also be included in your testing to ensure this functionality works as it should.

Backup and restore

We have mentioned backup and restore alongside disaster recovery several times in this book because it's very important. In *Chapter 2, Planning and Architecture*, we showed you how to put together a plan for Disaster Recovery. In *Chapter 6, Finalizing the Farm - Going Live*, we talked about scenarios that will come up as part of setting up a plan of action that are concerned with content size and other things that need to be considered when implementing this retention plan. Let's talk about this again so that we can feel comfortable that we have everything in place to support the content in the farm.

There are a few options in SharePoint that can help with good content management and security to manage access in a better way than just securing the site collections and using broken inheritance as granular security methods. We don't want to get into using these methods because they slow down migrations, even when using SharePoint as a user. The permissions have to be checked more frequently the more individual permissions you give. There are other ways around this, but the root of this is using groups to establish your overarching security within your sites.

I want to make sure to mention the data compliance features that are available within SharePoint Server 2019, Microsoft 365, and Azure. We do not want to omit that in the cloud, there are other features to support our data and how it is accessed and managed as well. We have not covered these areas thoroughly within the book, but we want to make sure to mention them as part of the backup and data protection strategy, because these features can be easily implemented in your SharePoint environment with some planning:

- **Data Retention:** This controls the life cycle of content within a SharePoint site. It can be a scheduled or in-place action from a user. Files, documents, folders, and content types can be moved, deleted, and managed.
- **Records Management:** This helps with declaring records within libraries in SharePoint sites. These documents cannot be deleted once declared a record.
- **Data Loss Prevention:** This helps to protect documents from malicious or accidental sharing. Details within the document can be scanned and identified, such as a social security number to prevent a user from sharing the information, or to limit sharing to only a subset of users.
- **eDiscovery:** This provides a way to legally hold content within SharePoint sites. You can provide this feature to regulate email and documents to help with legal disputes and other issues that might arise within your company, such as sharing intellectual property.
- **Rights Management:** This allows admins to set up policies on information within SharePoint and Exchange to protect against sharing outside the organization. It also provides deeper security on documents, and the policies can be valid externally. Azure also has Information Management, which can be used from the cloud and within SharePoint farms as well. The configuration for this integration is not complex but only allows you to create new policies within document libraries on-premises. There is no way to centralize policies when integrating with the cloud.

Please take a look at these areas as part of your backup and restore plan because they can help as you look at creating a plan for supporting the farm. There are strategies with all of these features that will help you understand how they fit into your backup and restore (Disaster Recovery) planning.

How do you plan to back up and restore your environment? The first area I would target would be SQL Server. When looking at SharePoint, you will see that SQL Server captures all your data in a database based on configuration, content, and services. So, in this case, we know what we need to concentrate on to successfully restore our environment if needed.

Storage is the first thing that comes to mind when we start looking at backups. Do you have sufficient storage when starting the planning process to hold the content from the SQL database server? Did you make some adjustments along the way that could have changed how much data is planned for the environment due to migration data? These are questions you need to answer now before going live.

As a process, things change, especially when you're doing migrations. You never know when something may come up during the process; for example, a department may want to bring over a file share or have documents on another system and they would like to move to a SharePoint library. Things change and you must roll with the punches in this type of scenario. There is no way to really plan for some of the challenges that you may face when it comes to personalities, department managers, relationships, and the overall data that can be left out of the mix when dealing with migrations.

Since we have planned for migration of content, we need to circle back and figure out if we have captured everything. Again, our first stop in solving the restoration issue we have with the environment is to back up our SQL Server databases. Next, to really find a sweet spot for total server restoration, we need to back up our servers. While doing this, we need to make sure we do a full server backup, including server state. Next, any components that are third-party need to be fully backed up.

SQL backups are easy to set up as a maintenance plan. They can be scheduled and perform maintenance on the databases as they are going through this scheduled plan. There are a few ways to do this, depending on the size of your environment. For small environments, this is a no-brainer: create a maintenance plan and follow some best practices. If you do not have a lot of processes running on the server or in the environment, nothing should really step on the toes of this process. Schedule it daily with various times for log backups during the day and you are done. You can also use PowerShell backups, which I will mention later in this section, to manage this process.

Larger environments require some thought and details due to other application processes, storage space, responsibility, and overall management of the backup from creation to off-site storage. So, if you are in a larger environment than a two to three server farm, we need to define some of these areas of support for our farm. With larger environments, you need to have some type of application to support the backup of the farm. There are many companies that offer tools that back up servers and have integration with SharePoint as well. Find a tool that works for you or, if you have one, see if they support integration with SharePoint.

As we mentioned previously, SharePoint should be the sole occupant on any SQL Server you deemed to be a SharePoint default SQL Server that holds the databases that support the configuration of the environment. So, in turn, we should not have any issues with outside application processes residing on the database server other than SharePoint. If you do, you need to figure out how to move those processes that support the other servers or be ready for some heavy troubleshooting and complexity when something happens to the performance of the farm.

Make sure to test your management tools for successful backups and restores. I have had an issue a few times where third-party tools lock the databases and SharePoint cannot function at the same time. There have also been issues where the database was in a different format than what SharePoint likes after restoring. Do not take the company's word for it and make sure these processes work before going live.

Since we know that SQL is our main focus point, let's focus on storage space. We defined this earlier, but we need to make sure we have enough space after all the migrations have taken place and new sites with new content come on board later. Let's go back and define how much space each will need and assess the situation so that we can increase the space if needed. Please make sure to define your file sizes when you perform migrations as these will play a big part in how much space is needed. Sometimes, we make mistakes by not setting limits on file sizes, which can eat up our space quickly. This should be discussed as part of your department interview process.

Who is responsible for the backups? Is it the SQL admin, SharePoint admin, or the server admin? Or is there a backup administrator? At this point, you need to figure out who is responsible for what. In the best scenario, one group should be responsible for the backups of the farm. So, if you have a backup team, let them be responsible. However, note that they must take on any best practices the SharePoint or SQL Server teams have to support the process. The more you can divide the responsibility, the better off your teams will function. This takes teamwork and cross training from requirements standpoint so that everyone understands the need of the environment.

Backup scheduling can cause some conflicts as well. Yes, we have scheduled backups, but which backups go offsite, and which backups come back in a certain amount of time? We need to make sure the management of our backups is documented and always monitored so that if we are sending media offsite, we can ensure they are labeled correctly and we know what's on the media leaving the building. Build your process on a spreadsheet or in a database if you like. Just make sure it is always downloaded so that, in the case of a disaster, you always have access to the latest copy. Make sure you have some type of chain of custody sign off within the process as well so that everyone understands what they did with this media as they did it. This is a very important part of our backup and restores the process.

Backup management also plays into how we restore data. Do we have the right media? Was the media labeled correctly? Restoring data from a SQL perspective is a process that has been documented many times on Microsoft's website and other blogs. We will not go into that here, but just know that SQL Server is your friend. It is what helps you restore any SharePoint component. Services, content, and configuration all have databases associated with the farm. Use those backups to restore as needed.

You can also use the Central Administration Backup and Restore area for restoring content from an unattached content database. The word "unattached" in this case means that the content database is part of your SQL Server list of live databases, but it is not part of the farm list of active databases. In this case, you have not attached the database yet. This is a powerful tool for recovering content, but it takes a little longer than a recycle bin or a migration tool due to the steps involved. However, this can be done while users are working on the system. **Unattached Content Database Data Recovery** is located in the **Backup and Restore** section of **Central Administration**:

Unattached Content Database Data Recovery ①

Warning: This page is not encrypted for secure communication. User names, passwords, and any other information will be sent in clear text. For more information, contact your administrator.

Database Name and Authentication Specify the content database server and content database name to connect to. Use of Windows authentication is strongly recommended. To use SQL authentication, specify the credentials which will be used to connect to the database.	Database Server SPSQLConnect
	Database Name
	Database authentication ☒ Windows authentication (recommended) ☐ SQL authentication Account
	Password
Operation to Perform Select an operation to perform on the content database you selected. You can browse the content of the content database, perform a site collection backup, or export a site or list.	Choose operation: ☒ Browse content ☐ Backup site collection ☐ Export site or list

Figure 7.18 – Unattached Content Database Data Recovery

There is also the recycle bin that works for files and other components that have been created in SharePoint. Here, you can find deleted components and documents and restore them back to their original locations. The content is available for as many days as you wish. By default, as shown in the **General Settings** section of any web application, this is 90 days. Once the 90-day period is up, the content is transferred to an admin recycle bin for the number of days you set. So, anyone who deletes any content can go back to those first 90 days and restore the content, after which the admin will have to restore it for them.

As we mentioned previously, there are different ways we can use the PowerShell backup tool to capture content and services. However, this is based on scripting, which can be a little clunky to use and requires your admin to be on their toes. These types of backups need to be monitored and checked daily because they are not 100% functioning applications. They rely on server scheduling and other processes to run. So, do not let this go past you; check the scripts and errors on your server.

Disaster Recovery is not as complex as you may think. If you have a site already, the easiest thing to do is set up a new farm in that location. Figure out how this farm should be configured as a standby. There are a couple of ways to do this using the Hot, Warm, and Cold scenarios for the off-site location. As far as content goes, using SQL Server to push logs to replicate the content to the new SQL Server locations would be the best way to configure the updates of content, either daily or hourly. The timing is up to you.

Having the bandwidth to move the content in big chunks is also another link that is very important. If you don't have the bandwidth, you can expect many delays in terms of how fast the data is moved from one site to another. Make sure to replicate the farm's resources as much as possible. If you have three WFE servers and two app servers, make sure you have that same configuration on the offsite farm. If you have changed and added a service application to the production farm, make sure to add that to the off-site farm. Managing these processes is the key to a successful Disaster Recovery plan for SharePoint.

As a recommendation, AvePoint cannot be beaten for the solutions they bring to the table in terms of overall farm management. If you are looking for a product that can help you manage servers, disaster recovery, content, and retention, look no further. Call them today because this is where you want to invest your time and money to support the environment – especially large environments that have more than three servers. You want to make sure you are covered so that you can sleep sound at night.

Do not forget to investigate solutions, regardless of whether it is the one I am recommending or something different. I have seen too many one-man teams managing a farm and other resources in the network and pulling their hair out. Do not pass this opportunity up at this point, even if you must push your delivery date back for your users. This is everything to your organization at this point, especially if they plan on building tools and other applications within the product.

You are now ready to prepare to go LIVE!

Summary

This chapter has shown you how SharePoint configuration is not as easy as people would believe. It takes some documentation, design, and thought process to make this happen. We covered a lot in this chapter, but the main point was to make sure you have covered all your areas of focus.

In the end, you do not want to release a product that is not complete. Make sure you have your backup and restore process documented and that you follow best practices for all your configuration. Double-check and work with your departments to resolve any issues upfront and make sure to tell them about any foreseen issues beforehand. The better your communication before going live, the better everything will be.

In the next chapter, *Chapter 8, Post-Implementation Operations and Maintenance*, we will discover what to expect on the scheduled cutover day. You will be provided with some tips on how to handle this, as well as some same day things to think about. We will also go over security, responsibilities, and the tools we can use for troubleshooting and maintenance, which will come in handy when we wish to support the environment.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. Which ports are used for the Workflow Manager configuration in a SharePoint farm?
2. Which MinRole should your Workflow Manager be installed on as a best practice?
3. When implementing load balancing, which is more cost-effective, a software or a hardware load balancer?
4. NLB does not require any resources from your SharePoint servers. True or False?
5. When meeting with departments about their migration, what should be the main goal of meeting with them?
6. When should I choose content database migration over a SharePoint migration tool?
7. What is one of the new features that can be used with outgoing mail?

8

Post-Implementation Operations and Maintenance

The purpose of this chapter is to let you know what to expect on the release day and things to keep in mind after the release of your environment. We will also focus on processes that should be in place that need to now be executed. These are the tasks that will come into play in supporting the farm immediately and in the future. Within those areas, we will also talk about how to handle the workloads that come from this release, which could mean a very busy day or days to come depending on the fallout from the farm you created and the content you migrated from your old farm. Teams will need to be in place to help support the immediate migration to the new farm. How do we assemble that team? Who needs to be available? These are some of the questions we tackle in this chapter.

As part of the migration, we also go into finalizing those documented errors and updates that need to be documented after the users start using the farm. We need to provide guidance on how they will be handled and how those incidents are pushed through our help desk process as part of the support for the farm. Where do we document those errors? How do we assign those tasks?

As far as the farm, we will look at the system errors and updates that may be needed to the farm configuration. We will look at some ways to troubleshoot and how to document those changes made to correct those errors for future reference. There also could be situations that are unforeseen, for which I will share some of my experiences with you to prepare you for what could happen.

Some of the questions you will ask yourself as part of this process are the following:

- What can I expect on day one?
- What should I have in place to help with that day and days to come?
- How will the help desk be affected?
- How should the team be organized to help with the minimal or large influx of calls?
- What happens if I missed something crucial to the user community?
- How should I handle management questions and outbursts in some cases?
- What if I only did a partial migration of data and there is data missing?
- Do I keep my same URLs from my past farm?
- How do I plan my DNS change?

We will tackle these questions and more in this chapter and make sure to give you guidance and recommendations on how to handle all situations that can come up in this new farm release. The main goal of this release is to be successful so your conduct and technical expertise will come into play in this area to support your deployment.

Remember that maintenance has also started on your farm as well, as this is your first day of release. We will investigate how to keep up your maintenance of the farm and what things are crucial on day one to make sure maintenance is working and any scheduled jobs or manual processes are documented and in place. Maintenance also includes the other environments, DEV and TEST, if you have set them up. We should be monitoring these areas as well to make sure teams using these environments are happy and there are no issues.

This is also a big day and exciting day as well, because of all your hard work. Be prepared and do not be on edge. Stay calm and collected as you will have issues, no matter how big or small the migration was nor how big or small the farm you deployed was. If you have followed this book from a high level and have collected documentation and done due diligence, you are more than 90% there, with some caveats depending on your environment. Now let's go through a day in the life of management, SharePoint admins, and supporting teams on the first day of release.

Technical requirements

For the reader to understand this chapter and the knowledge shared, the following requirements must be met:

- 1 year of SharePoint experience, managing SharePoint or general project management
- 3-5 years of technical experience administering a SharePoint farm

The code files for this chapter are placed at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Post-implementation

In the world of SharePoint, you hear so many horror stories about migrations and implementations that go wrong. These stories are very true. On my way to a customer site, I met a CTO who was doing a SharePoint implementation for 2010. He told me about the issues he faced while using SharePoint and I explained to him that SharePoint is all about planning and understanding what you want from it. He also mentioned he was unaware of some of the best practices I had mentioned, as were his team, and he said they did not use many service accounts in the configuration. They also had slow-running sites and the users were confused about how to use the platform.

So on the first day, please do not be surprised with comments, issues you may run into, or those for which you think you have covered everything thoroughly, because something always happens that cannot be explained in SharePoint in my experience. But you should be able to alleviate most issues that plague implementations if you follow this book, implement my recommendations, and dig deep in the areas mentioned. It is a lot of work in the beginning, but it pays off in the end.

In looking at the chapters that I have written, again I gave you as much information as I have noted and gathered over the years to help you prepare for this kick-off. Again it's up to you on what you use, and what you consider important or trivial, but from my experience, you have to take everything into consideration when standing up a new SharePoint environment or migration. The more thorough you are, the better your deployment. It takes a lot of handholding in some cases and a lot of patience to move forward with these types of releases.

Please make sure you have documented all your configurations and designs for your farm prior to releasing the farm. The more you document, the more information you have to find resolutions to those issues that may come up. Documentation is the key to a successful deployment as I have stated. You need a design document and an installation guide to really make the best of securing the details of your environment. This is necessary and not trivial. I have been to many companies that have documented nothing about their SharePoint environments. Make sure your documentation is up to date with any new changes and make sure to understand what you have built in your farm.

Now that we have that out of the way and have verified that we have documentation, have done testing of the new farm, and trained our users on the new features in the new version of SharePoint, we are now ready to release the farm. We should have updated all required information in all documents and stored these documents in a safe place with roles assigned on who can access, edit, and delete these documents, which is the number-one priority the day before day one. Some of these documents may change during these next few days so we need to make sure we are prepared to update any information necessary. Do not change anything without documenting what you are changing, no matter how rushed you are or how small you may think the change will be.

Our teams should also be prepared and ready to manage whatever situations may arise from this release of SharePoint. This should be their top priority for at least the first two weeks to a month. The teams should be briefed and this should include the following groups:

- Help desk staff
- Site collection admins
- Developers
- SQL administrators
- SharePoint administrators
- Active Directory administrators

- Server administrators
- Management

If you are a one-man shop, then you and your manager should be prepared to handle any calls that come directly to you. The calls related to the new environment are filtered as priority calls. If your team is large you should have already had meetings on how to handle calls and a process flow covering how help desk calls should be routed. We also need to make sure you have guidelines on how these calls should be documented. We will get into these areas later in this chapter.

As an example, you can see in the following figure a guide for how to provide separation of SharePoint duties:



Figure 8.1 – Farm and site collection admin

When following this model, you have feet on the ground with the user's department having a site collection admin take on any calls directly from the department. The site collection admin should have the knowledge to support all applications and structures within the department sites because they work closely with the department or team. This example provides separation between the farm admin and the site collection admin where issues may never make it to the farm admin tier or help desk. So why bug the farm admin when it is not necessary?

A lot of times, site issues are with code, developed functionality, workflows, forms, or just general questions from users who do not understand something. These areas supported are all under the direction of the site collection admin anyway. The site collection admin should organize things in the site collections under that person's direction, so they have a support team as well, and make sure the structure is being followed so that job is easier as well. They can manage one or many site collections, subsites, and projects, which can mean lots of the burden is on this position. This is a recommendation I always relay when talking to companies who use SharePoint and how they should structure their support.

As you can see, communications with users at this time are very crucial for the success of your implementation. Going back to the preceding figure, we have segregated control of the environment based on roles and there are other roles involved as well, who are outside of this example. The example also shows the duties of the farm admin role, who will make sure to check the servers, Central Administration, and any other server areas related to those resources that present the platform and services.

Then, as stated in *Chapter 2, Planning and Architecture*, we should have designated users specific to the departments or site collections that could be technically able to handle the management of the site collection. Again, as stated, this helps you to minimize calls to the help desk and they can keep track of help desk tickets that are local to a site collection admin who understands the department's layout, needs, and security.

One of the other project tasks we talked about was to hire a third-party vendor to help with the deployment and help with tasks in the post-implementation. This would be good for any company to provide an objective, second set of eyes on the process to make sure all things have been captured and make sure you are on the right track. This is especially needed for one-man shops that may not have all the skill sets needed to capture all details as they may not be as experienced in some technical and project functions.

As part of this process, we should build a quick SharePoint site, all of which should be able to be accessed to see posts on common issues. This will give the help desk and site collection admins a way to funnel calls that may need a fix that was already implemented and that the user can do themselves and keep track of the issues that have been called in. The blog post template would be the best way to show this information as it could be a set of step-by-step instructions posted in SharePoint. You can then have the user follow up after they went through that process or go through it with them while on the phone if necessary. The good thing about them having the link to this site is that they will know where to go before calling you for help, alleviating unnecessary phone calls and duplicate tickets. They can also pass this information along to other employees they know have the same issue.

Another way to be successful during post-implementation is to divide and conquer your tasks with the teams you have available. We should also have a page or two dedicated to the same site as the common issues we talked about in the preceding paragraph, which would provide an area where the other teams can manage help desk calls in an isolated area. This could be ServiceNow, another service platform, or SharePoint, and this can be done whichever way you want to handle it. Sometimes making this implementation more isolated from the normal help desk makes sense as it brings a more cohesive and collaborative way to make sure things are being corrected, documented, and seen by everyone on the teams working through the fallout from the implementation.

The hierarchy of support traditionally required to support a company's IT infrastructure is shown in the following figure:



Figure 8.2 – Traditional support model

Having this process isolated does not mean it cannot be kept as documentation and stored for later use. Doing this just means that the process is only available to certain support users and could also have its own phone number for taking calls, which isolates these issues for better tracking and documentation. This would deviate from the traditional support model I have seen in companies. This content could be later backed up and stored or kept open so that it is available, because sometimes we will need to get to this data to see related issues that may come up in the future.

This process is up to you, but I wanted to give some ideas about how I have seen this work in some organizations. All the ideas have a reason behind them and can be helpful depending on your requirements and or the situations your company may be in. You need to find the best solution that can help you work through issues with your users as you implement this new farm. Not following some or all these recommendations can only mean disaster, especially when you are being held accountable for this new environment. It's best to be thorough, and again, **document** everything you can to make sure you have covered all bases.

During the weekend of the cutover, you should also have an individual or team (depending on the size of your farm) testing that all sites are fully migrated if your project included migrations. These migrations would consist of migration tool connectivity, speed, and functionality, while still executing other tasks.

The following is my list of out-of-the-box and superuser functionality that will need to be tested:

- Create a list
- Create a library
- Upload a document
- Create a column
- Create a content type
- Create a workflow 2010 and 2013
- Test existing workflows
- InfoPath Forms
- Create views
- InfoPath publishing
- Create a subsite
- Create a site with a template
- Test site settings (Search settings and Term Store)
- Test Search
- Incoming and outgoing mail
- Notifications in sites and SharePoint Designer workflows
- Find a file (List Search)
- Test People Picker
- Test advanced permissions
- Managed Metadata
- Navigation from Quick Launch and Top Navigation
- Test farm solutions deployed to the site collection
- Verify web parts and other areas in the site are functioning
- Test content and structure
- Syncing tasks
- Open in Windows Explorer
- Recycle Bin

As part of this exercise, you will want to document the functionality for each site tested using a spreadsheet or SharePoint list. This could be a spot check or even a full site list check throughout the farm. It all depends on whether you have enough time and resources to do this. Again, this is very important and will reflect on the support needed on Monday when your users come back to work. This gives you a heads-up on errors, which then gives you a heads-up on fixing issues and documenting how you fixed those issues. I have had some sites not work after migration using out-of-the-box functionality, so please be sure to test these functionalities before releasing.

This exercise with testing also gives you a heads-up on those sites that are working as they should and those that are not. You also can communicate with the department (the site collection admin) that owns the site to have them look through the site as well just to check whether there are some things they do that are more customized so they can verify those specifically and report on them.

Also, capturing images, technical errors, functional errors, and time and date information related to those errors and details on the site where the error happened is also helpful for the tech support team when troubleshooting. There is nothing like having all the information you need so you can really dig deep to find a solution immediately. This should be communicated to the site collection admins, so they know what information they need to supply if this is farm-related.

DNS cutover and on-premise migrations

It is the weekend of your cutover and you may ask, *what should I be doing?* There are steps we need to follow to make sure URLs for our SharePoint sites have been moved and or updated, and are working and functional for the company within the network. This takes involvement from your network team to make sure to set up DNS entries and HOST files for your path-based or host-named site collections. This could be a cloud or on-premise environment we are talking about when it comes to resources needed to provide support for these implementations.

There are a couple of questions that come up when migration comes into play. What if you want new URLs for your web applications? What if you want to preserve your URLs and move them over to the new location? Both have different processes and steps that need to be followed. If you want to know which is the easiest way to move to a new environment, my take on this is that it takes more effort to use the same URL in a different environment.

There is not much that is easy when keeping the same URLs. However, the big benefit is that it does relieve the chore of all your users saving new bookmarks for the new locations of their content. You would think that was easy, but I have run into some issues with this that show a broken rendering of the site. Those issues come from the user's desktop caching, which is seen in *Figure 8.4* in this chapter.

Mind you, you could also have some changes in the content structure as well, which you would need to communicate. When migrating and making changes to any environment, it is the time to make those content changes as well. It could be a new site or even some newly developed functionality, but this is not the time to tell your users about these types of changes. Site mappings and structural changes should have been discussed by the user's site collection admin who should relay these types of events.

These changes should have been done way earlier, during your design phase, and any changes documented at that time. A lot of times admins may change the way sites are mapped during migration because it is a convenient time to make the change, and will move content based on the company's structure. If we have done these types of changes we should have communicated those changes to our users long ago.

Take for instance an acquisition – you may have many sites or changes that need to be merged into your site map. Content and structure could be a big issue as part of your design. This is a good example of when these types of changes would come into play.

When keeping old URLs, we need to also make sure that our old farm is online as well and in read-only mode as we migrate content. We also need to make sure this has been done and is functioning because we do not want any data changing, which would bring the need to do incremental migrations using ShareGate or other migration tools. The worst thing that could happen is a user getting to the old site and making changes to the old site not knowing they are not in the right location.

These types of issues can also be handled with changes to site colors and messages on the front page of the site to make sure people know this is the old site. The reason for the security is that these sites and data cannot change as we try to get the latest and greatest content from the old farm migrated to the new farm.

We also need to change the URL for the old farm and update the DNS entries for these URLs as well after the cutover. If we need to keep the old farm online and in read-only mode for a period, we need to make sure that this task is completed during this weekend of change. This farm could be up and running for another month or more depending on your requirements. Once that point is reached, these servers can be backed up and removed or repurposed as resources for other applications.

Use the following script to update all site collections in a web application to read-only:

```
# Get the Web Application
$WebApp = Get-SPWebApplication "https://my.company.com"
#Loop through all site collections and Set read only status
foreach ($SPsite in $webApp.Sites)
{
```

```
$SPsite.ReadOnly = $true  
#Or : Set-SPSiteAdministration -LockState "Unlock"  
-Identity $SPsite.url  
}
```

These changes could take time, as they need to propagate over the network, so all users get the new changes when they log in through the network. These changes consist of IP addresses, network segmentation, routing changes, firewall changes, load balancers, and other areas that may need updating to successfully connect the environment to this new URL.

We must also consider the old location where, in this configuration, we may be updating the name of the URL and associating it with a new IP address. These changes can also take time to be propagated successfully over your network. The bigger your network is, the longer it may take for these changes to take effect.

When using path-based site collections, you will see that there is a one-to-one integration with the site and DNS entry. Path-based sites prepend the site collection to the end of the URL. Preparing your web application is easy in this case, and starts from when you created the web application. Making sure you have the right URL and then the correct choices for the host header, authentication type, and ports, all of which are in that form we used to create the web application. These are very important to get correct because if not, you will have to recreate these web apps, in some cases with information that may not match what you had previously. Naming your web application is also important also so you know what web application it is you are working with specifically.

DNS cutover could mean something totally different to those using host-named site collections. This type of implementation takes a whole other process to complete. To start, each site collection will have its own URL, which is a management nightmare if you look at this at a high level. There are other configurations that are involved with host-named site collections as well, as you have to use realms, many DNS entries for each site collection, and HOST file entries on all servers in the farm, and if you are integrating a cloud-based authentication solution, this could mean extra steps in creating and securing your web application as well, as these will also require setup and installation.

In *Figure 8.3*, you will notice that when keeping the same URL, there are not many changes needed. You could add a server or two to the new environment but under the surface there are many things that need to be configured:

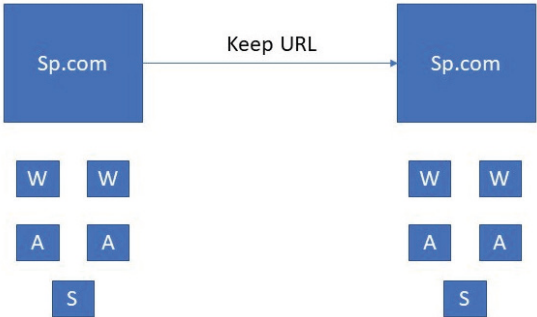


Figure 8.3 – Keeping the same URL (migration)

Remember when you keep the URL from another network segment or network, be it servers in your own environment or a separate cloud service provider, your users may run into issues with rendering sites correctly. The following screenshot shows what your users could see as part of their experience on the first day of using the newly implemented web applications:

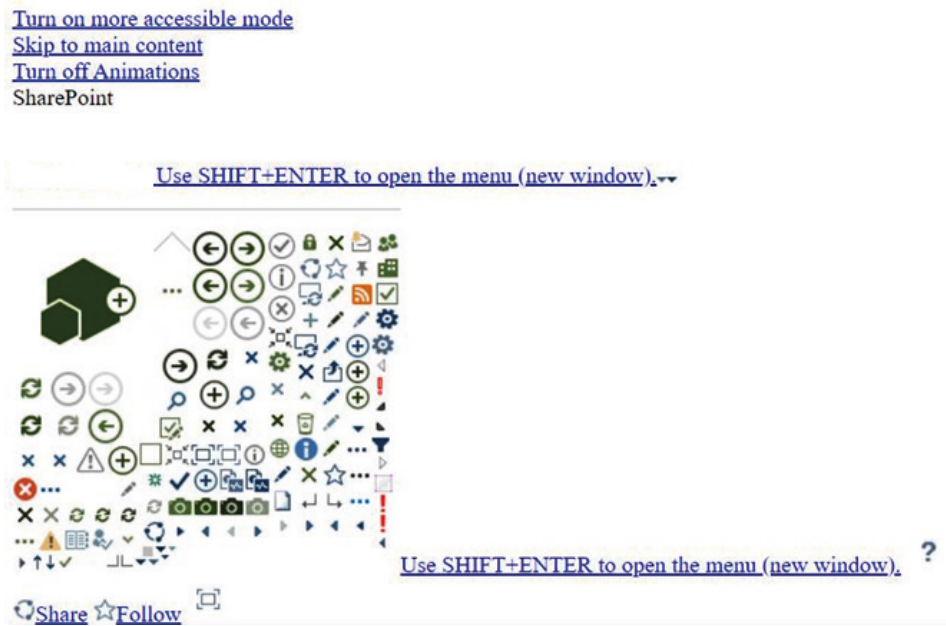


Figure 8.4 – An error rendering the site (first day, same URL)

As you can see in this example of a user going to a migrated site for the first time, when migrated from cloud service to cloud service, the sites could come out garbled or dismantled, and some of the sites may not load fully and look to be in a loop depending on the type of authentication used. Authentication can be messy as well because if you have a cloud provider, this authentication must be in sync with your old farm and your new farm as well. So, there are potential risks with this implementation that will be unforeseen but most can be corrected using the cloud provider's application interface, as we can within Okta. This situation happened to me on a huge migration project, and after six migrations, this situation suddenly reared its ugly head.

I have seen this happen only with cloud-based authentication solutions. You will see a Signing in to Sharepoint loop, as the user is trying to authenticate but cannot due to the authentication process looping.

To resolve this issue, you want the user to clear their cache, the SSL cache, FlushDNS, and even the Windows cache to start fresh when accessing the new URL location. The SSL cache may also need to be cleared as well, as this also keeps a cache for the system. I have had this happen and it is not fun when you have over 90k users having this issue and needing to know this information. It is best to include this in your planning, so everyone is aware prior to the migration by testing sites within the production environment prior to users gaining access. In my case, we were not afforded the time to test before migration.

You might say, *well, why wouldn't you test this in DEV or TEST?* Well, you cannot test in these environments unless you set up the exact same URL in another environment that has its own Active Directory and network structure. The URL can be recreated in an environment where you have a DNS entry for this web application without causing conflicts. Most likely, looking at my experience, not too many people have the luxury of having a whole separate network environment for DEV and TEST. They are usually servers on the same network using the same Active Directory structure.

URL changes using alternate access mappings are an alternative to using the default web applications but again as I stated, you would only be using one IIS site for both the default site and the alternate access mapping if there were two URLs you wanted to use for access to a site. You can have up to five URLs pointing to one IIS site. There are five zones you can use when adding alternate access mappings.

Make sure to catch any of these mappings on the farm you are migrating from, so you can include them in the configurations on the new farm. They are useful when you want to just have an alternate URL to bind against a main web application with a different URL name, maybe using it for a specific department or group of users.

To add a new alternate access mappings, use the following script but also remember you may have several web applications you need to update. The following code will work with traditional web applications or, as stated, path-based web applications:

```
New-SPAlternateURL -WebApplication "http://server.yourcompany.com" -URL "http://sp.yourcompany.com" -Zone Internet
```

In the case of *Figure 8.3*, we are looking at an internal on-premise SharePoint farm and a migration from one set of servers to another. When using the server-named web applications, this also gives us a way to test our content by connecting to it, testing authentication, and looking through content to make sure all content is migrated and services are working correctly before we even start this DNS change process. When in testing, the URL does not matter too much at that point. This helps us with time management so that we can start this days or weeks before we do our final migration. The URL can be changed later when we need it.

This method of server-named web applications is an easy way to set up a web application quickly without the need for networking teams to get involved. The server already has a DNS name and IP, and is configured on the network, so utilizing this makes sense just to do some testing. It also gives us an opportunity to have users go in and test and review content, workflows, and other areas of their sites we may not know about. They also have the opportunity to do a spot check before the sites have fully been migrated.

In my experience, this is not done often enough and the communication from the SharePoint teams is usually nonexistent for this type of sanity check. In most cases, it happens because of time constraints and a lack of understanding of how necessary these tests really are before going live. Therefore, it is very important to plan and not rush during an implementation like this where it affects almost everyone in your company and even external users in some cases.

We also need to remember that if we are using DEV and TEST environments, this can also be done using those environments to migrate too before bringing content into production. As part of our migration process, this should be number one on our list of tasks as this is so important. Please make sure to set up these environments even if they are just one or two servers.

In my experience, this is not the case as most SharePoint Admins do not have these environments set up for us to use to brainstorm, test configurations, and develop processes. Even if you just have a small DEV environment, it helps you to be able to test something before bringing it to the production farm. There are so many problems you can face later if you do not follow this process. If you don't follow this process, you may end up releasing a farm riddled with errors.

Note

One of my pet peeves is migrating directly to production and potentially having errors in production on services that have not been released yet. Be wise and create DEV and TEST environments to make sure your content and services are working as they should before migrating to production, documenting the configuration for each environment. When you get to PROD it should be pretty much perfect. This also gives you a way to test with users' content prior to releasing to production, which then you can use different URLs to do so. Production should be perfect, or close to it!

So, in our current on-premise enterprise, we would make sure to make changes to the DNS the day you tell the users the systems will be down. So, if you schedule the system to be down on Friday at 6 p.m. and you are expecting the system back up 5 a.m. on Monday morning, then that window of time is to be used to migrate your DNS. This gives a chance for URLs especially to be propagated and updated to where the new IP location of that URL is moving. The best time to migrate is a holiday weekend or over Christmas through New Year's, where there are not many people online due to the holidays.

This also gives you time to make any updates to your firewalls and other areas in your network that could be a concern, especially when it comes to external access. This also gives you time to configure (if you haven't already) and test your load balancer using the URL. Propagation also has time to finish and update all network changes, so users do not get errors when trying to connect to content.

As we are talking about internal enterprise changes, we also need to remember that we also need to test our connectivity to our new URLs and even the old URLs if they are staying in place. This should also be done during this downtime. We want to make sure we do not have any missed DNS entries or weird errors, especially when using ADFS or other intermediate applications for authentication. If you are leaving your old farm in place, we need to make sure to test whether the old farm is working with the current or new URL assigned to it. This is only preserved as a read-only site for verification.

When looking at this scenario from path-based web applications and host-named site collections, we will see that there is a big difference in how we would utilize our time during the cutover. If you have a path-based web application and you are migrating that application, it all needs to come over that weekend. Everything in the content databases associated with the web application must be migrated all at once.

With host-named site collections, you can look at this very differently. The path-based web application at the top of the URL does not have to be migrated; only the site collections with URLs below the web application do, and they do not all have to go at one time. I have seen some instances where there was a mixture of both in a host-named site collection's web application. At that point, you would move all your site collections as you feel but at the end, all path-based web applications could move when the top-level web application is moved, as I have seen before where some of those top-level web applications have had path-based site collections added by accident. Please check before moving this content.

There are more content strategies for on-premise migrations in *Chapter 9, Managing Performance and Troubleshooting*. There are some strategies outlined within the cloud migration details in the following section that can also be used for on-premise migrations when it comes to content structuring.

Cloud migrations and cut over

In the case where you are moving cloud providers, it can be very tricky migrating from one service provider to another. There are so many factors that come into play as part of a migration from one cloud service to another, or even from on-premise to the cloud. Let's talk through some scenarios and figure out what we should be looking for in a cloud provider.

Migrating to a new cloud service sounds easy enough. If you look at this from a high level you would think all you have to do is set up new servers on the new provider, install SharePoint, and migrate your content over to the new SQL server. Sounds like a great plan in theory, but that is easier said than done.

There are so many gray areas that can come into play, where things may be different in the new cloud provider's interface such that you miss something very important that can set you back weeks. When looking at network interfaces – the way servers communicate using the new provider – and maintaining the services and setup, you will be in for a rude awakening even after you have made your migration.

When choosing a cloud provider, you really want to explore what the company offers as services and make sure they fit what you are looking for. Here is a list of a couple of things you can pay attention to when hunting for a new cloud provider, to help you find the right provider for your new SharePoint environment:

- Their **Service-Level Agreement (SLA)**
- Robust security and data protection features
- The range of services they provide
- Migration assistance
- The best in connectivity

From an overall contract position, most cloud providers will send you a long and complicated SLA. This should be read in its entirety by your management and even a company lawyer. This agreement will solidify your relationship with your new service provider, so this SLA is very important. You may have some unique requirements this provider may not understand or even offer support for. Having a clear understanding at the start should be your focus at this point before signing any contracts. If you are looking for compliance at a high level due to your industry, make sure to choose a provider that meets those requirements.

When cloud first came on the scene, security was a big concern. This was due to horror stories that people heard from other companies and the services had not matured to meet the needs of high-profile government agencies. Those worries are gone now, except for maybe a few small gray areas, but overall, you can pretty much now trust your providers with the security of your presence in the cloud.

There are a few things to look for but one of the most important is how data is transmitted from your business and the cloud. Is it secure? Does your provider use some of the best technology to secure your data? This should be the questions you need to investigate by asking your provider about these areas of concern and researching blogs and other companies that may be using this provider's services. Blogs sometimes give you hints on what shortcomings your provider may have.

Other areas that affect data are transfer speeds and how we get our data from one platform to another. Ask yourself, *will this take me weeks or months to complete? How much storage do I need on my new cloud platform?* Questions like these are key to discovering key areas of connectivity. This even weighs on how your users will connect to the new services. Does the platform meet your needs? Most likely, yes, but you must really test drive this platform to see what you uncover, and in most cases, it's going to take you trusting your provider and testing your systems and processes on the platform after migration. At that point, you will be able to tweak as needed to get the most out of the platform. I will explain more later in this section about my experience of moving from RackSpace to AWS.

You also want to see how your new provider handles physical security. Where are they located? Do they have multiple locations? Are these locations dispersed around the world? These are just a few things to think about with physical location. Even with those physical locations, how does the provider handle weather disasters, security breaches, and damage that could happen due to accidents or robbery? This should be the least of your concerns. The provider should make you feel at ease when it comes to the protection of your data and should have disaster recovery in mind and be able to explain how their failover secures your data from disaster. Services could be affected by these incidents as well.

Providers offer such a vast range of services and in some cases, you may have one that provides 80% of what you are looking for and another that provides only 50% of what you are looking for. The 80% provider may have 20% of the services you need out of the box. So do your investigation and wisely choose the best fit for your organization. This may be two providers but that comes as a cost.

The thing to keep in mind is that when moving to the cloud, the first thing you want is a place to expand and exploit new capabilities. The goal in all this is to provide services that expand your business and even bring more continuity to the business using applications and enhancing business processes. Looking at a provider's future goals would be another area of concern. What are they planning to bring to the table in the future? These are all things to think about during this time.

As stated, when looking at cloud providers, you will come across a new platform where your current IT professionals may not have the expertise. This is where you look to your provider to see what professional services may be included in your subscription for their cloud and how you can get your current employees trained on the platform through other training providers. This brings up the questions of, *where do we start? Does the provider have these training services available? How long will it take to get the employees trained?* Talk to them to get more details on a plan moving forward. In most cases, they have done this all before and can provide recommendations.

When looking at training and services, we arrive at another issue that brings all of this together at the bottom line: cost. *What is it going to cost me to move from my current platform to this new platform? How is this going to affect my business and customers?* These are some of the things you need to think about as you walk through the process of choosing a provider and what can transpire as part of this migration that may affect your business.

Choosing a cloud provider and a subscription that fits will give you a total sum for the bottom line and you then can adjust as you see fit. The big thing to consider is yes, you are moving to the cloud, but moving to the cloud is going to enhance your systems, streamline your processes and give you more to offer to your customers. So, the ROI could make the difference in how you see the cloud playing in your migration as well. Think about these things.

Again, in most cases, you will do an incremental migration, migrating areas within your environment separately when possible and moving the services to the new platform. The thing is, I am only talking about SharePoint in this book, but we need to consider other services that are provided in your current environment. Create a plan of action once you have chosen a provider. Move your systems as you see fit and create a plan that works for you and the resources you need to get the job done. If you need help, call a third-party company or some consultants to help you manage the migration.

Reflecting on this section, we covered the following topics:

- Environmental differences
- Training
- Cost

Please make sure to review and ask questions before you make a move to the cloud. This is a pivotal move that can make or break your company. One mistake could leave you with a long-lasting migration where a platform like SharePoint is way behind schedule and you are paying for an engineer to migrate the platform. You have paid for their service and nothing has been migrated. Now you are paying for servers in your current platform and servers on the new platform. This is not cost-effective at all and can lead to you spending a lot more than planned.

This exact situation occurred on a project I was on recently. After I analyzed what happened, I could have saved the company over a million dollars in costs if I had started the project. There was more to this story, but at a high level, I was brought in later in the project to help the current consultant.

I made recommendations the first week I was there, and they were ignored. Fast-forward 4 months later and I am on the project with a third-party vendor now and just starting to migrate content. The other consultant was let go two months prior.

This brings up some great points, but we will not dive into this. I have touched upon a lot of them in the book already but the points I am trying to make here are the following:

- Planning is everything.
- Choosing the right people is everything.
- Experience matters in most cases.
- Always evaluate your position constantly.
- Never overlook a recommendation.

In looking at these points, one stands out to me: planning for cloud migrations with SharePoint. I have focused a lot on planning in this book because it's everything that matters. For instance, you have a large amount of data, so you already know that the connection speed could slow you down for database transfers if doing a content database migration, and even when using a tool such as ShareGate.

Depending on the speed of the connection to your current provider's network, you could see slow transfers of content databases and slow migration of content using a tool. It is best to let your provider know what you are doing and see if they have other pipelines you can use to transfer data. As part of that setup, you would want to include secure tunneling to move the data from point A to point B as well.

In this scenario with SharePoint, you would want to look at your databases as well. You could also come across large databases that need to be minimized as per best practice sizing of 100 GB to 200 GB, which is a reasonable size to get the fastest transfers from one provider to another. On premises, this will not have much bearing on your migration, but over the internet to separate cloud providers, this could be an immediate cause of concern, especially when you are talking about costs and the ability to move the data as you planned to. As stated, the goal is to not have to pay more for your old system than you have to. You want to move and be done with the former services, so you do not have to pay both companies for very long at the same time.

There are services that some cloud providers have available that help with the migration of large data. Amazon offers a few ways of moving these large databases, called Snowball and Snow Mobile, which give you a way to get those extra-large data files moved faster but require some physical logistics to make this happen.

These services are hardware-related and you basically get a piece of hardware and copy the data from your server to this hardware. Once the data is copied, you send it over to your new service provider and they use it to copy the data to your new cloud instance.

Amazon S3 is a transfer acceleration service and has some requirements you must meet as well. I used this to do a 15 TB content database migration and it worked like a charm. Please look for these services online and find out which you can take advantage of in cases where you just cannot or do not have time to downsize content in your databases. If your databases are more than 600 GB, you will have an issue getting those databases copied over in a decent amount of time. There is an upload process and then a download process on the other end.

To elevate some of the stress on content size, there are a few things to remember. Again, the best practice size for content databases, as mentioned previously, is 100 GB to 200 GB, but investigating the content to see what you can do to mitigate issues with content size can help to soften the blow of the time required. This exercise really helps you to load balance the content over the databases to make them less in size. Even creating new databases that will help you manage what sites you want to move and many sites may not want to move at a specific time. There could be plans you need to follow for moving sites by department or even by priority.

Let's look at a couple of things you can do to make size less of an issue when copying a database from one service to another:

- Site collection cleanup
- Moving site collections
- Promotion of sites to site collections (use a tool)

With the cloud, we also have hybrid configurations that come into play when you want to keep your server on premises or in a cloud environment, and connect to a cloud service such as Microsoft 365. This service, along with Azure, really have some cool tools you can take advantage of. We will talk about hybrid configurations and how these come into play in *Chapter 10, SharePoint Advanced Reporting and Features*.

Site collection cleanup: This is the easiest way to delete old content and you should have done this in the planning stages of your implementation. Verifying that a site is still being used and or is valid is something you should do right away. If you have not done this, then you want to try and get this done one evening before your migration weekend as you migrate incrementally. The process consists of validating the site for deletion with the site collection admin and then backing it up for retrieval if something goes wrong is the first step of the process. Then, at that point, you can delete the site collection. This is done in cases where there may be a need for this site later.

Site collection moves: This is the next option we have and is not that hard to do but it takes time and patience to make sure you are validating which sites need to be moved and what database they are moving to. This does require some updating to your current documentation so that we know where the site now resides in case there is a need to move the sites in the future. To do this, you need to use PowerShell. Before we do this though, we need to see what site collections are available within the content databases. We can do that by either looking through Central Administration using **View all site collections** and clicking on the site collection to see what content database it is associated with and making a list or using the following PowerShell script:

```
Get-SPContentDatabase | %{Write-Output "- $_.Name";  
foreach($site in $_.sites){write-Output $site.url}} > Drive\  
Folder\sitecollections.txt
```

Or, alternatively, you could use the following:

```
Get-SPSite -Limit All -ContentDatabase contentdbname | select  
url, @{label="Size";Expression={$_.usage.storage}}
```

The difference between each is that from the first PowerShell script, it is understood that it is going through and getting the content database and listing all site collections under it. The second command lists all the site collections and storage used within the database. Choose how you want to do this, but both can be of help in any situation:

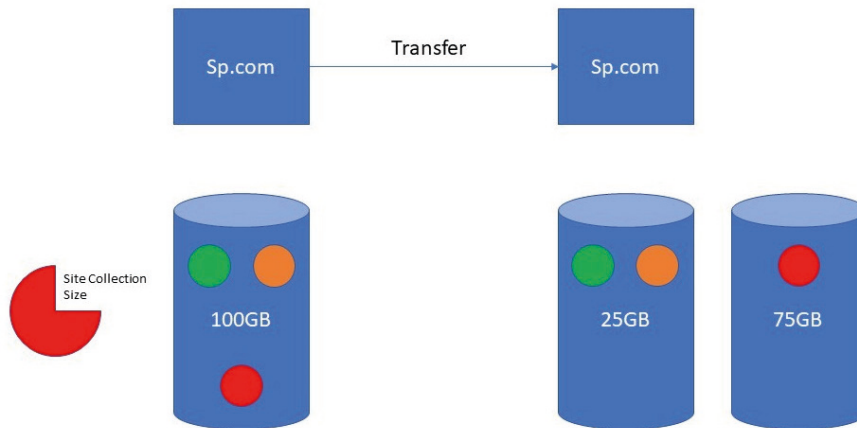


Figure 8.5 – Site collection move

You would then create a new content database as shown in the following snippet:

```
New-SPContentDatabase -identity NEWCONTENTDATABASENAME
```

Once you create that content database using your naming convention, then use this PowerShell command to move the site collection from the current location to the new location (the content database). See the following code for this:

```
Move-SPSite <Site-Collection-URL> -DestinationDatabase  
"<Database-Name>"
```

To show you how this would work, take for example a content database named "A", which has site collections running, and a new content database named "B", which was just created and is empty. The total size of content database "A" is 100 GB and it has 3 site collections. The total size of the one red site collection is very large, at 75 GB, as shown in *Figure 8.5*. We would then move that site collection from the current content database to the new one, so we alleviate the size of the current database. Now that we have created a new database "B", where this site collection is able to grow, content database "A" is now able to grow as well with more space.

This is a good practice to follow, especially when you are moving content from one site to another. This also helps with incremental pushes of content if you are using a tool once you get your content database moved to the new location, as the size of those transfers is not large in size, so the amount of time to move is not as long.



Figure 8.6 – Changing the URL

Again, knowing environmental differences is very important, as the settings within the cloud provider's networks and a basic understanding of that network could be a learning curve. Moving data is a big portion of a migration. This is something you would have to have had discussed previously in your planning stages or you would not be where you are in this book. Knowing how to use AWS, Azure, Rackspace or any cloud environment is a plus and if your admins needed training, they should have already been through this training already. There are so many things that are different in each of these providers' services because they each have their own ecosystems.

One of the things I noticed on AWS, for example, is that just because you set firewall settings on a server doesn't mean that port will work or be open for your servers to communicate through. There are also other layers that control this portion of the AWS network. You do not want to learn this at this stage of the game. This should have been something you learned during installation and configuration.

Before I install SharePoint, I make sure all firewall ports are open and local policies are set correctly for all service accounts that are needed for a successful deployment so I do not have issues later with failed services and trying to figure out and troubleshoot problems after the release of the environment. Make sure you know your platforms before you start, or get help from the service provider immediately for any issues or problems.

Not understanding the environment also affects your plans in other ways. This could happen with unexpected pitfalls and the need for more training. This can also lead to unexpected service costs or migration tools at a cost per GB – it could even be several things that pop up at this time that you did not expect. The biggest is the fact that you must keep the old servers online for a longer period than you expected.

Migrating from cloud to cloud comes with costs, even though you may not be using the service actively. Your provider will understand you're moving, but they will continue to bill you until you have finished moving or deleting your objects or have asked them to shut down your subscription areas. So, while preparing your new environment for use, you need to be preparing your old environment for deletion as well.

This means you need to figure out everything that needs to move, whether it's the databases, folders with files in them, mapped drives with the content on servers you may not know about, or whatever you may have that you may need going forward to protect you from loss of data.

As far as migration tool costs go, you must look at this from a migration perspective. These tools cost us per gigabyte, so we must be careful. We can sit here all day and say all is going to go well, but there is the chance that you start the tool and it doesn't do what you expect, and you have to restart the process of incrementally migrating that content to the new sites. This can add a lot of extra costs depending on how much content you just made a mistake migrating. Test within your internal environment using some trial software for which your provider will give you a certain amount of gigabytes to test. Whether it's on-premise or on the cloud, make sure you understand the settings within the migration tool so you do not have to redo any work. The trial time with the tool will also help you figure out the use of the tool and how it works.

In some cases, old content is usually sitting around on SQL servers, and in some cases, is still running on the database server but not attached to the SharePoint farm. There also may be some content in mapped drives that have been planned as part of the migration. These files need to be vetted and cleaned up as part of this process.

As part of planning, these areas should have been reviewed, deleted, and taken into consideration already in your planning phase but if you have not done this, you will need to finalize the data you want to move. You never know when someone is going to ask for information from a few years back that may not be online or in backups. This way, you have those databases or data that may be unused for a long time but if it is asked for in the future, you will have it.

With this old content, we need to be able to document the content as well. The following questions might pop up in your mind:

- What was that database being used for?
- Was it attached to a web app?
- Was it a part of a department's site?
- What was this folder on the server used for that seems to have scripts or content in it?
- Do we have some PowerShell scripts running as scheduled tasks that need to be moved?
- Did we check the GAC for any custom solutions?

The answers to those questions need to be investigated and you need to make sure they are documented. This goes for services databases as well. If you have an old service database, you should keep it and just label it correctly on a backup drive or some media for review.

Did you take a backup?

As part of the migration from cloud service to cloud service, and even in the case of server-to-server migration within an on-premises implementation, the gathering of old data and content should be the focus when it comes to preserving information. You want to make sure before moving environments, especially in a cloud environment, that you have accounted for everything. If you are not organized and have folders on servers where you keep things and mapped drive locations which has files on other servers, then this is the time for you to search and find data. You could also take a snapshot of old backups from SQL servers as well to make sure you have retention in place where you needed to recover some data. Figure out a good point in time to go back to and take those backups with you.

If you are in this mode of finding data, you want to make sure you do not have to go through this again, so applying a fresh start and clean slate to this new farm environment is the key to a healthy start. Do not go back to bad habits and do things as you used to. If you need help with that and have some resources that can be used to check behind you, make sure to do so at this time. It is time for a change and the beginnings of managing this environment properly.

So, after you have found the files you are looking for and copied them to a central location, what do you do now? You can have your old cloud provider give you backup space, or provide them with a USB drive to get the data copied to a backup location. There are not many choices and it all depends on how you want to move the data. If you do not want to use the service any longer, then the easiest way would be to have the USB or storage added to a server or storage hardware and copy the files there. You can have them send the hardware back to you through the mail and or use OneDrive or another cloud storage service to move files as well, but they all come with a cost depending on the storage needed.

If you use a cloud location, you then have to take the time to copy up and then copy down from the location, which could mean several days or weeks of time spent monitoring, being at risk of losing your connection, and as I stated, cost. Timeouts can happen if the connection is broken, which add to costs because you must start over, which also lengthens the time required to move those files. Choosing a method will be best for you to decide. I can make recommendations, but you know your situation and time frames at this point in your migration. Please just be aware of stumbling blocks and make sure to understand your cloud environment policies.

In *Chapter 2, Planning and Architecture*, we talked about disaster recovery and how to implement a plan for backing up your SharePoint farm. There are many ways to build redundancy in your new farm. If you plan to use our outline to develop a Disaster Recovery Plan then make sure you put in place some of these options to help you build a good backup and recovery plan. As part of the plan, we also want to take into consideration all the locations and files you have gathered that SharePoint used or was involved with in the old farm. These files are important and we should be backing up those locations as well.

As far as databases are concerned, we can use SQL mirroring or SQL Always On to build a redundant system for failover. This will help to prevent any data loss. Of course, this all depends on where your other SQL server is located. If you do not have a great data pipeline built between those two locations, either locally or externally, the connectivity will fail. There are requirements for these systems to be external and the communication speed needed to sustain connectivity between SQL servers. Please investigate these configurations before starting to build a second or third server for geographical purposes.

Database mirroring and replication also work the same way. I believe I mentioned a product from AvePoint, called Replicator, that helps with these scenarios. Please investigate third-party solutions as well, which may give you more in-depth control over the information being pushed to another location or server on your network. Out-of-the-box mirroring works, and so do transfers such as log shipping, but it all depends on your requirements as to how you build the systems to support backup and recovery. Check out all available options before proceeding and also look at the configuration best practices for these areas first before starting any work, as they may not work out depending on your needs.

As far as restoration, you will need to follow some basic rules around your database sizes, which should be around the 200 GB size limit. The smaller your databases, the faster the recovery. Please try to stick to that as much as possible. Always look at a site collection that is getting close to that limit as they need to add a new site collection and not more disk space. You can add links to the new site collection within the original, and use the Portal Connection in site settings to make them site-related.

Labeling your databases properly also helps if there is prioritization during the recovery, where you have an ordered list of what sites are to be online first to last, as this could come into play in some company structures. This has been mentioned throughout the book. Naming is everything, and stops you from deleting something that you need. When restoring, do not leave a restored database name, such as **Restored_11_10_2019**. This is a no-no!

Drive selection for your backup will also come into play. Please use a local drive to provide storage for your SQL backups. Once those backups have been completed, then copy them to cloud storage or another server. Of course, this process needs to be orchestrated and tested, because backups should be captured and then removed so that the next batch of backups have the space to be captured the next day. If you want to capture more than one day's worth of backups, make sure to have the storage available to hold that amount of days multiplied by the database sizes being stored.

Using less costly disk space for backups is fine if there is not a lot of activity and the size of your databases is not too large, but you would need the right amount of space for storage of these files. Using RAID 10 will help to increase the speed of your backup as it does not manage parity. This type of configuration on your disks will read and write faster. This will come at a cost, as this would be looked at as a higher functioning disk configuration.

Avoid running backups when other processes are running or when there is a lot of user traffic on the systems. This could include a process built by a developer that runs at night, or a process where some other maintenance is being captured on SharePoint or SQL Server using PowerShell scheduled jobs, SharePoint custom timer jobs, and other customizations that may take time to process.

Again, as mentioned in *Chapter 2, Planning and Architecture*, please also remember to schedule full, incremental, and differential backups as needed. This will make sure to capture RTO, as a full backup may not pull the most recent data for you once restored. The incremental and differential backups will help to make sure you bring your database up to date with the most recent content that was available before you had a hiccup on the system. Make sure, if you schedule a backup of the database, to include the logs on every backup type as well.

If you are crunched for time, as this process again is orchestrated and needs to have an order to it, please use compression if your backups are taking too long. This can affect the CPU as it does need more processing power to complete the backup process, but time is money, and in this case, sanity. You want to make sure you get backups done every night. Losing data doesn't work when it's needed for restoring operations. Even when using SharePoint Shell cmdlets such as `Export-SPWeb`, the command automatically compresses the exported information. If we use the `-NoFileCompression` parameter as part of this command line, then we see that we have a larger output, which takes up more storage.

Some final thoughts are to always make sure to back up your ULS logs and any other locations needed to support your SharePoint farm. If you lose a server, you want to make sure you have that information available for restoring as well. Blob storage is another location you need to make sure you have tackled as part of the restore process. Depending on the method you used to configure this custom location, make sure to find the right solution for the restoration of these files and structures.

First-day blues

Although I tried to get as much in this book as possible on the configuration, migration, and management of your SharePoint project based on my experiences and lessons learned, there could still be issues that I have not come across. There could also be some things you did not ask about during this process or that others did not mention while in meetings with departments or stakeholders, as I have been in that situation before as well. This book really provides a list of everything you need, which I could think of and noted down to eliminate having anything missed during this process.

If you have done those things and understand where you are and what to look forward to then good for you. Either way, the first day is very stressful because you do not know what to expect. If you have worked with SharePoint long enough, you will understand what I am saying. You could have triple-checked everything, and still, something will happen to blindside you. So, on the first day, be ready for the unexpected and make sure you are notified of things that go wrong immediately.

You should also have a **Release Management Process** in place to make sure that you understand the first versions of customizations that have been changed during this process or updated due to changes in the newer version of SharePoint. The developers should have already tackled this but this process should help us understand what versions of customizations should be deployed in the farm. If you are using Team Foundation Server, the versions of these solutions should be captured there. If not, make sure the developers have a process in place that supports this process. We talk about this more in *Chapter 12, SharePoint Framework*.

Think over your steps thoroughly as you go through this process and if you worked over the weekend as you most likely have, then make sure you prepare for release day. Make sure to get some rest on that Sunday or the day before to prepare for your morning. If your management gets in at 6 a.m., you need to be in at 4-5 a.m. This is to make sure things are *still* working correctly, as you will need to do some spot testing and make sure that any early users do not have issues connecting to the site. Using a warm-up script would help in keeping the site fresh so that those first users connecting are always connected without waiting until the app pool spins up. There are warm-up scripts on the Microsoft Office site that are good and easy to use. We talk about these more in *Chapter 9, Managing Performance and Troubleshooting*.

By getting in early, you could also most likely mitigate any other issues in those first few days of the release before the first users of the system get in the office. It is always good to be in early before the users get in the office to make sure things are working, especially for the first couple of weeks. SharePoint has a way of making the top list of applications, but is never deemed a Tier 1 application, I've noticed. So be ready to be treated like a Tier 1 and expect to have a busy week or month.

As part of those first users connecting to the system, you will also want to look over *Chapter 9, Managing Performance and Troubleshooting*; as stated, warm-up scripts play a big part in ensuring that the site does not take long to load for the first user of the system. There are other things you can do to make content render quickly using database maintenance and other areas we will cover in that chapter as well.

We also want to check the servers as well and make sure all servers are in place, functioning, haven't blue screened, and are performing well with no error messages detected in our Windows logs or ULS logs that might have come up during the evening. A lot of times after the SharePoint jobs run through their schedules (which could be hourly, daily, weekly, and monthly), there could be something that comes up in our SharePoint Health Analyzer.

We should also check the backups and any SharePoint server-side jobs you may have running. You should have a backup of the systems and sites to start so that the content can be baselined before being made available for the user community. If there are any issues or you notice that there are errors in your backups that were not there before, make sure to document those errors and start with the errors that need to be resolved immediately.

Logging errors will be part of your day today. You want to make sure you have a site or list dedicated to this release. You want to tag all errors you encounter as high, medium, or low. These errors also need to be categorized and if they are duplicated, they need to be combined so you don't have a long list of errors you have to report to management that include duplicate errors from different users. Make sure to show related errors as one error, even if it is not the same error. Set priorities on these errors as well to make sure attention is focused on the errors and issues you record as appropriate.

As stated in this section, we want to have a site and pages dedicated to our issues. We should categorize all our issues that are reported and use a system like that in the following figure:

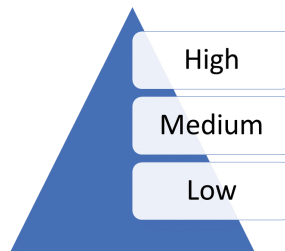


Figure 8.7 – Categorization of issues

Having levels of urgency, whether it's three or five levels, would help in managing those critical issues that may affect more users than a lower-level issue where it may only affect a user's desktop and the version of IE they are using. It is important to manage this, as due to their expectations, your management will really look hard at this, more so than the number of tickets you may have unresolved.

Understanding team dynamics

Supporting this effort will be a challenge depending on how many users you have, the size of the farm, the number of internal sites, the number of external sites, and so on. So, the best efforts to support this environment need to be enthusiastically shared across the team, as well as wanting the best for the users and customers that access this environment. If you are hosting SharePoint services, then you have a bigger task of supplying the best efforts for your platform and support for your customers.

There are many team players as I have pointed out in this chapter and you will need the time of all of them at some point. Make sure you have met with the teams and have gone over your expectations for each of them. They need to understand what you want from them during this time as they will have other areas they will be supporting within the company as well. So, you do not want to overburden them where they are not able to help you or are slow to respond because they didn't know the plans for this new environment or migration project.

In creating the best support efforts for your environment, communication and collaboration are key to a successful implementation. The more you can get the team working together and understanding their jobs in this process, the better off you will be. For example, handing off errors to the technical team is part of the process, but if you are handing over user training issues, trivial issues, or duplicated errors to the technical team, this will not be a good use of their time. Sorting and managing this list of issues is the key to success and you get a quicker turnaround on getting these errors resolved.

As part of this process, centralizing the process and incidents is another area of concern, as I have seen many ways other companies have handled implementation and migration cutover days differently. When reviewing these companies, I found that some of their plans did not work due to the lack of communication between groups and the tools they were using to manage the list of incidents.

When separating the processes visually using different solutions to host the incidents, communication gets lost or misunderstood. It is best to centralize and use a system where others from different teams can view and sort the incidents. The reason is that another team may have the answer, as SharePoint Server resources span many areas of Microsoft technology. We must be aware of that and make sure we do not leave any eyes or ears out of the loop.

In my travels, SharePoint is the best tool to use because of its collaborative nature and the way it helps to centralize the information. It also does not take much time to set up a good prototype to support this process. Most people who support SharePoint already know how it works and they can manage the views and manipulate the data. Processes can be automated if you have time, so that if you assign an issue to someone, they get notified and can document the trail of notes and resolutions.

You can also prioritize items and make sure some have bigger priority over others in the queue. As shown in the following diagram, your team intersects with many other teams:

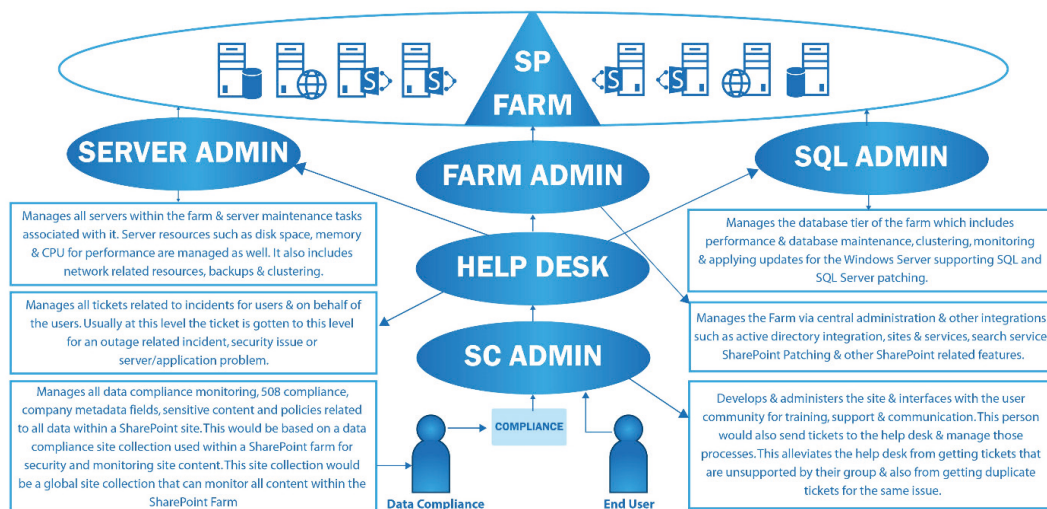


Figure 8.8 – Support structure for a SharePoint farm

I shared this diagram in *Chapter 2, Planning and Architecture*, to help with planning resources. If you have not done this exercise the time is now to get organized before you move forward. Do not go into this unorganized and with no plan. You cannot wing this unless SharePoint is just a sub-system where it's not high in priority in your organization. I have never seen this be true because it's such a sharing tool that even if it's grown out of the wild wild west it will be considered very important. Again, it maybe not considered tier one, but it is to a lot of people.

One product that I have seen that can help take some weight off the teams are Governance Solutions. Governance Solutions can be put in place to give the user the freedom to create sites or site collections as an example to get those types of requests moved from your queue. This puts the power in the hands of the users but also can be streamlined for certain users who have the access to do it.

The big thing with this Governance Solution is that it can also be used to keep things in order, such as naming conventions and use of templates for site collections. This gives the users strict options to move forward with creating something in the farm but you are putting rules around that content to make it useful, size the content and name it based on a naming convention as an example.

Once everything has been completed and you have successfully moved into your new environment there is another resource that will come into play to help guide the development process called the Business Analyst. This role in my travels has been mostly nonexistent. I have only seen this role implemented on two customer sites out of the over 100 I have been to over the years.

The role is a key role in development and interfacing with the user community. When you look at this compared to a site collection admin or someone keeping the interface between the farm admin and the user community this is the role needed to help guide those communications. The site collection admin still has that key role of communication, but the Business Analyst helps to provide information back to developers and the farm admin, so coordination of newly developed solutions is guided and documented correctly.

Their key responsibilities are the following:

- Understand how the business operates
- Understand SharePoint from a technical and user standpoint
- Developer background preferred (not a must)
- Identify gaps and opportunities to improve the service
- Identify where automation can be used to help business processes
- Technically document requirements and user feedback on testing
- Document and help in any areas of this process

The reason I did not have this role documented in the image is because they are not really part of the technical staff that supports the implementation. This role is more to guide new and in process developed solutions. They should have skills to help with the implementation, but their focus is not an administrative task at the farm level. This role helps users and site collection admins come up with solutions to problems to help build the right solution to support the community. This is a key role and there need to be more companies utilizing this skill set in their collaboration space.

Incident management concepts

The farm is down on the first day, what do I do? Good question! Pray it's nothing you missed. Most likely in these cases, it could be anything—storage, network outage, server down—but whatever it is you need to respond quickly. During these first days and really the first month things will be on edge because things are settling in with the team and the user community. As time goes on you will see things start to be more and more stable and users become more and more happy unless they just do not like SharePoint. (We do have some people like that...LOL.)

The technical team again consists of SharePoint Admins, SQL Admins, Network Resources, Storage Resources, and others who may have a part in this wide-ranged system. As stated, the collaboration between these teams needs to be fluent and responses need to be almost immediate, especially for incidents like the preceding one.

For technical issues like the one described previously, with a total outage of services, we must be careful. We must respond quickly and make sure to try and fix the problem as quickly as possible. So, this would include logging the incident within the centralized system and relaying this to the team and management right away. Major outages I would always include management, so they are not blindsided. In the end, you will save your manager some grief.

Next, I would work the incident to see if this is an easy fix or a major outage where it will take time so I can communicate that back to the team and management. Once you figure the issue out and you see that it is a fix that you can resolve, follow your process to fix that issue. This could mean doing it right away for a major outage like the one described, or if it's something that only affects a certain department then we see how it affects the farm, and if it's something where you have to take down resources then maybe it could wait until after hours to be completed. This is all part of your process within your company that could include a change management process as well.

At this point, all teams should be on standby and processes should be streamlined. I know in some companies I have been with it takes time to get approval for calling outside vendors, vendor-customer numbers and or login information is not readily available, and other procurement factors can come into play. At this stage in the game, you do not want to have these types of hiccups. Make sure your teams are ready and have the information needed to make calls on the spot for support.

This help could include some help from outside vendors like Microsoft as well where you may have something a little more involved where you need an expert to look at the issue over your shoulder. This requires time especially dealing with Microsoft because it will take some time to log the call and, depending on your service agreement, you could be waiting 4 hours for a response by contract. So, the quicker you find the issue and what you need to fix the problem the better off you are to get management a solid update.

Make sure again to report success and failures immediately. Even if you are working with an outside vendor, always communicate to keep some updates going. For me, it is bad to have your manager calling you for an update instead of you providing one. It keeps them off your back and fully aware of the status, even if it is using Teams or email.

When to meet and when to include management? All throughout the process. Meeting with management should only take place if there is a failure where your vendor could not fix the issue. This is when you need management to make a decision as this could mean some rework in the configuration and you will have to think of ways to work around the farm so at least some people can continue working if possible, or some type of way to be partially up and running on this new platform.

Exploring troubleshooting tools

I wanted to list some troubleshooting tools to get you thinking about what you need during this event of handing over this new SharePoint environment. We will talk in more detail in *Chapter 9, Managing Performance and Troubleshooting*. For now, we will document some tools you may want to consider for troubleshooting any issues you may encounter during this process of supporting the farm. To download any of these tools, please see my GitHub and find the download link or do a search yourself, but make sure you are going to a reliable source:

- **Netmon:** This is a tool used to monitor communication between App and Web servers, Active Directory, DNS, SQL, and the client, in this case, would be your end users.
- **Event Viewer:** These logs are the go-to for SharePoint admins. These logs, which are located on the server, will point out issues quickly within the OS that is supporting the application, which in this case is SharePoint. I have used these logs to troubleshoot issues, but they do not always give you the answer to an underlying problem.
- **Perfmon:** These are the tools that are built into the Windows Server and Desktop operating systems and can be used to find out core issues with performance on server and desktop resources. Monitoring all aspects of a SharePoint server farm is important when you are troubleshooting so do not forget SQL. Counters for the specific server types and services are viewable via Microsoft's website.
- **PAL:** This is an extension of Perfmon as it helps you to identify issues quickly using the performance monitor capture. This tool was created by a PFE at Microsoft and is used widely for assessments and other reports for SharePoint. It makes your life easier by converting the performance files into something you can read easily. This is a CodePlex download and is available on that site.
- **ULS Viewer:** This is a great tool provided by Microsoft. I would not recommend any of the other tools who provide similar functionality. You can copy logs and send them to others to review (if small enough in size) and the product does not have to be loaded on the server. It's a great tool to find issues with problems in SharePoint.

- **Fiddler:** This is a network monitoring application I have used a lot in the past as well as Netmon. I prefer Fiddler because I am more familiar with it but have heard great things about Netmon.
- **PowerShell:** It has many commands that people may be unaware of, like `Merge-SPLogFile`. This combines all trace log entries from all the servers in the farm into one single file on the local computer. `Merge-SPUsageLog` is also available to merge usage logs.
- **SharePoint Designer:** This tool is very helpful when looking at site related issues and changes you may need to make to sites and related files. I have used SharePoint Designer in some cases to change the look and feel of the site, change filenames, permissions, and many other areas. This tool is used to make life easier managing sites within SharePoint.

These tools will get you started on troubleshooting issues and find solutions to problems within your environments. Most issues come from not following best practices.

I have mentioned that several times in this book as well. Microsoft tests the SharePoint environments using these best practices and this list of practices and software limits can really save you when implementing SharePoint. We talk more about how to use a few of these tools in *Chapter 9, Managing Performance and Troubleshooting*.

Maintaining the environments

The first day of your new environment means if you have followed this high-level plan in this book you are doing things differently in most cases. The last thing you want to do is follow old habits and bring them into your new environment. So, when you encounter an issue with content, check it first in production find out what the issue is. Unless this is something simple where you can fix it easily without configuration changes I would not troubleshoot in production. I see a lot of admins guessing on solutions to issues and when they do not work they cause more issues or leave residue from the attempted fix that is not cleaned up.

The way to keep production clean is to create a backup of the site or site collection and migrate it to the DEV environment. Then test the content in DEV and see if you get the same behavior. This alleviates any issues you may cause with PowerShell scripts and other troubleshooting methods that may disturb the production farm. Once you have found a solution, test the solution in the TEST environment and figure out if that fix worked as well.

If you have all three environments, GREAT! If not, it is time to do things differently. Do not make the same mistakes you made in your last farm environment. Work towards keeping Production clean and healthy by illuminating excess from failed development projects and other changes made to the server resources without testing first. This goes for Microsoft Updates as well as we apply those updates to the product and the OS and SQL servers. You want to test these updates before proceeding to apply these updates to your production farm. This is a best practice! Your SharePoint environments should at the least mimic the following image conceptually:

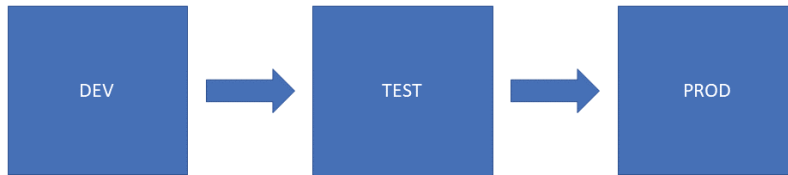


Figure 8.9 – Needed SharePoint environments

Your test (TEST) and production (PROD) environments should have the same server footprint or be similar in server footprint. There are also other environments that can be added, such as DEVINT, which will give you a single source-testing environment where an individual tester can go in and test any updates or changes that were fixed in the code from development first, which then protects your TEST environment. The developers would not deploy the code or even have access to this environment. The code would be deployed and tested independently to avoid any tampering. The code changes made in this environment should work as described, or be backed out of and retested, so we know the code works.

Security is the most important consideration, as I have seen everything you can imagine. I have had customers who have had development environments and used the same service accounts in production environments. They had also deleted accounts as well, and I have even seen customers who have disabled accounts used in all environments, worsening the effects of the mistake of using the same account across all environments. Guess what? SharePoint went down.

To avoid the headache of managing all your service accounts you should separate them. You want to make sure to use separate accounts for each environment. This could even be from separate AD domains as well, which is the ideal situation you would want for this type of configuration. The reason for this is to make sure that accounts being used in DEV work with the resources in DEV and then resources in TEST work with TEST. PROD should be separated as well so the accounts are associated with the proper environment.

If you want to use the same AD domain, make sure to use separate **Organizational Units (OUs)** and separate servers, with groups based on admin, test user accounts, and service accounts to make sure the accounts are separated and have something in the naming convention that indicates the environment that the account is being used for, such as `Domain\DevSPAdmin`. This is a good way to tell where that service account should reside and if it is not in the right place, you can see so immediately and do something about that right away.

To add to that, make sure not to install SharePoint using an account you do not want to own your environment. There is no way to change this, so using personal accounts and for instance, a DEV farm account from the PROD environment, would not be an ideal situation to be in. All accounts should be defined for specific uses and environments. If a personal account was used as the farm admin account to install the service, once that person leaves the organization you are stuck having that account active for the life of the farm.

Again, this is only to help you make sense of what these environments are used for. This is something you must do to maintain your sanity when you are managing three SharePoint farms and any little slip-up could cause you an outage.

Change management processes are an ongoing effort and help to alleviate issues caused by changes to your environment(s). The change process can be involved in controlling when changes are allowed, setting an approval for the change, and scheduling the resources to implement the change request. Implementing a change management process also allows you to document how the change went in terms of its success, and add those documents that show how the change will be implemented. Keeping track of changes within each environment helps to backtrack as well, so you can see what has happened and be able to go back through the history to understand where there could have been a mistake made. Having that history is priceless if you have documentation that shows what was done during that change request, especially concerning the code and developers.

SharePoint can help you with documenting change requests, and I have put together simple change request processes that can be used to manage updates to systems, applications, and services. There are other tools out there as well that do the same thing. I prefer SharePoint because it centralizes your information and makes it available to those that you want to see it. So, requests can be made, and the process can be started and finished using a simple workflow created by your team. Having this process in place is priceless but you must use it.

Zero downtime and patching is a way of keeping your environment up and running without the need for interruptions to your user base due to Windows Update or maintenance processes. One of the big areas you will see change over the course of your farm is the need for monthly maintenance to your farm, which is done to implement changes and updates to features and services within your farm. These updates are published on what is called Patch Tuesday, which is the second Tuesday in the month.

Note

For more detail on zero downtime patching, consult the Microsoft documentation at <https://docs.microsoft.com/en-us/sharepoint/upgrade-and-update/sharepoint-server-2016-zero-downtime-patching-steps>.

As stated in prior chapters, you should have already come up with a baseline and schedule for patches and have implemented the following areas for inclusion:

- Identifying patches needed (do not forget Project Server, AppFabric, and third-party integrations)
- Leaving time for testing in DEV environment
- Leaving time for testing in the TEST environment
- Implementing the patches in the production environment
- In the process of this implementation, making sure all servers have each update

When doing a fresh install, as we talked about in prior chapters, you must be aware of changes in the environment. You will see errors in the Health Analyzer that may point to databases being out of sync and servers that may be missing patches. This is the time to upgrade all servers and all databases to make sure the farm is cohesive. This should have been done when doing your installation by applying the latest patches at this time. If a newer patch has come up, then you can apply that if you want as well, but the farm needs to have a baseline at some point.

Important note

This is so important, and I cannot stress enough the importance of making sure your farm is in good standing. Checking the statuses of the database, product, patch, and your Health Analyzer after changes have been applied is critical. Remember to wait a day before checking, or run all the timer jobs that update the status of these components so you can see the effects.

Having a baseline helps in the amount of work you must put in as an admin. This means you do not have to go back and check the farm again because it is understood you will be releasing the farm at a baseline you determine. A mistake made by most admins is they go back and apply updates to a farm and do not remember which servers they applied them to. Documenting and paying attention to detail can be a pain, I know, but you can avoid mistakes by updating all documentation and knowing where you left off if you had to break off before finishing the update task. This could have also slipped through the hands of the Windows admins who control **Windows Server Update Services (WSUS)**. Make sure to only download those patches and not automatically install SharePoint patches.

When you look at your farm from Central Administration, in the **Upgrade and Migration** area you will see a **Check product and path installation status** option:

Upgrade and Migration

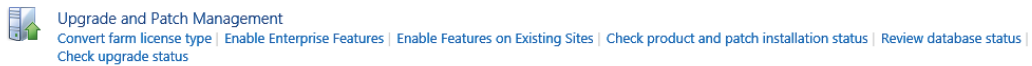


Figure 8.10 – Check the product and path installation status

If your servers are out of compliance as far as the server role is concerned, those issues will come up. When servers are not on the same patch level, you may see some performance issues, as well as feature functionalities being intermittent. Remember, `PSConfig` is your friend, and make sure to always update your farm using this command by running it on each server so that patches are rolled up and configured. You can also use the SharePoint Configuration Wizard on each server to update them as well.

The following PowerShell command will come in hand:

```
Get-SPPProduct -Local
```

The preceding command shows the version of SharePoint you are currently running. This can be run after patching and this will update your system (`config db`) to the latest version of SharePoint it is running. It also updates operations in the SharePoint database and ensures the information is accurate by updating the SharePoint configuration database information. This is also the equivalent of running the Product Version timer job, as I have had issues with servers updating but still facing an error because of not having the right version when trying to connect to the farm.

Note

Again, for all content databases that need an update, you should refer to `Update-SPContentDatabase "database name"`. Updating services' databases requires different commands based on different services depending on the error given. Please do some research on Microsoft's website.

Configuration management is a term you do not hear much anymore. I used to hear this a lot back in the mainframe days in the 1980s and 90s. Today I believe it is still important, but things have changed so much with technology that I do not see a lot of people doing this and managing it correctly. It is important to remember we need to make sure to keep our farms configured the same in each environment. If we are making changes to those environments, the changes to Central Administration would need to be implemented on the other environments as well. If I make a feature change, I should change it on my other environments as well – and document it!

Updates to all areas of our network, servers, and other areas where we depend on testing these updates in an environment that can be changed – all of these need to be documented. Pushing things through environments can be a challenge if you are not configuring areas where you will need high-level services configured before you can implement a process.

Say you have not implemented Project Server in your lower environment, and you install it and never document the steps for production. The next person who implements it in a higher environment implements it differently than you did. Now we have issues in the higher environment due to not following the process of documenting, testing, and passing the working implementation documentation on to the next environment.

Change management and configuration management are very important, and are here for you to work with to make your life easier. Yes, it takes some extra time but in the long run, this will help you sleep at night and not be awakened by calls from developers complaining that the systems are not working correctly. Make sure to take this recommendation seriously for SharePoint implementations. SharePoint can be a massive pain if you do not manage it correctly.

Tools are also available to push content from one environment to another. The use of replication can keep data fresh and keep all of the environment's content the same as production. This can be a lifesaver in some instances where having content from production will help you in determining the best development process. With this, configuration management is the key to success for this to happen because if you have services running in production that key in on certain content and those same services are not running in a lower environment, you will see errors and content will not be in a good state, which could cause issues that are not recoverable from.

Some of the tools that you can use range from SQL log shipping to AvePoint Replication services. I am sure there are some services and third-party tools that can come into play here as well. My experience has been with AvePoint and although it works in general, you may have to see if it will work for your specific situation and requirements. AvePoint makes great tools that tend to be missing out-of-the-box features such as replication, so please check with them for a demo. I know a couple of my customers in the past used this product and things went well. Cost might also be a factor at this point, if you have not thought about it already. Talk with your management and see if this is something they can provide to help you with migrating content.

Why is a development environment important?

Again, I have mentioned this throughout this book, and this is the final hour. I want to mention this again because I need you to understand how important your DEV environment is to the success of your production environment. In some cases, you may not have developers but you may have people who want to play out-of-the-box development, which also can lead to corruption and sites not working as they should if not managed correctly.

The best bet is to implement a development environment and use it to support any users who want to make changes to the production environment. This way you can have them practice here and implement in the production environment by documenting the steps needed for the implementation. You could even have them document the change they want to implement so you can check it before it is done in production, as in a change management review process.

In some environments, there could be many developers, so you would have to create separate farms for using server resources. This is the best way (and I have seen many ways of doing this) to have some separation and individual ways of supporting the developers. Do not go down the road to having many developers on one farm. There are many issues just with rebooting, and resetting IIS could be a big issue when another project needs to be completed.

Using GitHub as a cloud-based code repository works well for Microsoft 365 and Azure for developers to add code and version-control it. Azure DevOps Server also works and can be used by many developers at a time. If you are using Sprints to move your code through the process, the developers can create folders based on the Sprint and add the code in the folder for that Sprint. Once completed, they can check it in for tests and testers can download the code from this central location to use for testing and implementing in higher environments.

Why do you need a test environment?

Since we discussed the DEV environment, we need to mention why the TEST environment is important as well. The TEST environment should mimic your production environment as far as the server footprint. We may not give this environment the same storage or server resources, but this environment should have the same configuration as your production farm. The reason for this is so you can test how integrations and other configurations and development will be implemented. This also gives the opportunity to users to see how things will work before they are passed on to the production environment.

Testing helps achieve successful deployments either on a schedule or in general use of the practice. Without testing, there would be no way to see if you are affecting areas in SharePoint that maybe you shouldn't, and if the code works you implemented an out-of-the-box development that may not be able to be achieved due to differences in the platforms. Testing is everything to the sanity of your production environment. Let users test before they drive. Make it a point to have this environment available with production data so that the users get a feel for it before you implement it.

Production – why you should be cautious

I have seen production resources used in many ways, and some were not the best. Production to me means the latest source of content that has been updated by the user community. How can we develop our production environment with confidence? Can we expect these developed features and sites to be 100% error-free? If we allow development in production, you will be bound to have an error or two, which could be a small thing or a very intrusive thing.

Production during the later process of migrating from one source to a new destination should always be the final stage. When I say final stage, I mean the following situation:

- All testing is done in other environments.
- All services have been configured and reconfigured in other environments.
- Documented processes for setting up services that work.
- Documented service accounts used for these configurations.
- Documented errors in lower environments have been fixed.

The bottom line is to apply only proven concepts to this environment. Even this method is not foolproof all the time. You may have developers who have developed and pushed code through testing in other environments, but it still fails in the production environment. In these cases, you need to figure out what happened, and if it does not work, then back out of your code in most cases when you can't find a way to correct it. This situation can really complicate things.

The difficulty in this approach is that developers are not perfect, and a lot of times they expect to be able to rebuild an environment based on code that was pushed through testing but there are some gaps. Say you added a new AD group to a site. You gave that group permissions to content within the site during that Sprint. Now you have updated the way this content is viewed; maybe, say we created a list in the beginning but now they are moving to their own subsite as this group needs more functionality. Suddenly you need to make that change – how does the code capture this when going through Sprints? It will apply everything as it was during that Sprint, so now there could be some confusion as to whether to delete the document library they used. So, any number of things can happen to rebuild from code.

Taking that example we know there is no way to recreate an environment from code. So, the best thing is not to rely on code and never implement code that is not tested. The last thing you need is a major slip-up in a Sprint that changes the way the site was designed. My point here is you need the lower environments to make sure you have done your due diligence to provide the best code and updates to your production farm. Once there's a backup, you are golden, with some caveats for updates from code you have deployed, but do not get hooked on your code being your backup.

Summary

Going live with your new farm takes a lot of planning and attention to detail. As you have seen in this chapter, there were lots of references to prior chapters to make you aware of some of the things you may have missed. A lot of the information in this chapter was mentioned way back at the beginning, but if you still didn't take those areas of concern into consideration, you can see how they can come back to haunt you right before deployment. This happens a lot, and if you did run into this issue, you are one of many.

As stated, planning and implementing a SharePoint environment takes patience, organization, teamwork, and cross-team support. Even the best technically sound SharePoint admin will miss things, and this could be due to not being organized or just not having the patience to document the environment. These, as well as other errors, come into play when depending on one person to do all the work. In this type of implementation, do not let one person do this job alone. This is not a job for one person. Make sure to have a team around this person to help, even if it is just to document the process and technical aspects.

The moral of this chapter is that if you missed something, make sure to clean it up before releasing. The effects when you do not pay attention to detail in some cases are devastating. It is better to make sure the environment is sound now than have to answer to your boss later.

In the next chapter, we look at performance and troubleshooting. This chapter will help explain some of the concepts we have covered in this chapter and give you more in-depth information on the topics. The next chapter also takes a thorough look at troubleshooting tools and performance tools.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. When making the decision to release your farm to the users in production, what are some of the things you want to check before the cutover?
2. Issues may arise after the cutover. The help desk should have had training to handle these new help desk calls. True or false?
3. What are some of the basic site functionalities that should be tested before the cutover?
4. Why do you need a test environment for your SharePoint farm?
5. When using the zero downtime process to update your environment, what is the key to a successful update process?
6. A user calls and says the SharePoint site looks like it's been dismantled. What do you suggest they do, as the site was migrated using the same URLs from another farm?

9

Managing Performance and Troubleshooting

Managing performance for SharePoint Server has not changed much from prior versions. The same tools and processes you used in the past can be used in this version, though there are some caveats. Some of the things we did with other SharePoint versions have become integrated into the configuration of the platform, which gives us a baseline to make even more performance improvements. SQL and SharePoint settings are automatically configured in some cases, whereas in the past, we had to do it ourselves.

In this chapter, we will talk about ways to get a baseline configuration documented on your environment and what tools there are to help you get there. This includes tools that will help you configure your baseline, as well as things admins forget as part of their environment. There are many ways to slice and dice this and I will not be able to cover all possible areas. However, I will point you in the right direction so that you can move forward with getting your server resources figured out and set up for success.

The following topics will be covered in this chapter:

- Performance overview
- Troubleshooting tips
- SQL Server performance

Let's get started!

Technical requirements

The technical requirements for this chapter are as follows:

- Experience using SharePoint Administration versions 2007, 2010, 2013, and 2016
- Lite coding using Visual Studio

You can find the code present in this chapter in this book's GitHub repository at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Performance overview

All users want is speed and reliability when it comes to satisfying the services provided by SharePoint and your team. I cannot tell you how many times I have been confronted by users and management on why something is performing slowly. Tuning performance ensures that the platform is solid and working as it should, while also giving users the ability to quickly do their work.

When SharePoint runs slowly or is not reliable, you run the risk of users not being able to complete work – there could be major work being done in SharePoint you may know nothing about. I have been on site at a bank where a process ran every day at the same time. No one knew what was going on. We did some performance checks and figured out it was coming from a specific department. It ended up being a reconciliation process that was custom developed for one of the departments.

This type of scenario is common because, as farm administrators, we do not commonly get in the weeds talking to developers all the time or talking with user groups, but we should be. In the previous chapter, I mentioned a hierarchical support model for the SharePoint service. Within that diagram, there were relationships that were built between the support staff and brown bags, as well as information sharing going on between farm admins and users.

This tells us what people are doing, but it also helps us figure out what teams are going to do in the future. This makes everyone aware of those future processes because they could come with modifications that are needed for the systems to perform those duties successfully. This also gives you time to change things as needed to support any content structures, such as web applications, site collections, and other areas, where you can split off a new process to isolation, which also helps with performance.

A lot of times, as admins, we pay too much attention to the high-level requirements, such as Microsoft recommendations on minimum RAM, CPU, and disk space, but there is a lot more to performance that we seem to forget. Sometimes, even with those minimum recommendations, admins still undercut the server resources, thinking it is not a good minimum. They then run servers on less than the minimum specifications, which is a bad choice.

I am here to tell you to make sure you use those minimum specifications. Microsoft tests SharePoint Server builds before releasing the product to give us best practices. Those minimum recommendations are captured for a reason. This is done to set the expectation level of SharePoint running in an environment where you can be comfortable that the product will work as it should.

The performance of your farm all depends on how you created it. Here, again, you use best practices and software boundaries to figure out what is supported. If you are not separating processes, understanding where and how processes run, and figuring out the overhead of related processes that may run in the environment, then you are going to lose the battle. There are also other areas where you can isolate some processes at the web application level, thus giving a site its own IIS space, or even a site collection level, where the site collection is in its own content database.

When systems are slowed by poorly performing configurations, depending on the user or group who encountered the issues while the system was running slowly, you could either have an angry mob or a single user who just puts in a help desk ticket. A single user is not that noticeable in the overall company because it is a single incident that is isolated. There is the factor of who that user is, of course, which depends on their rank and position in the company.

In the case of an angry mob having an issue that is consistent across departments, this will get you and your boss's attention. These incidents are the ones you want to avoid if possible. That is why, in this book, I have been basically preaching about best practices and making sure you have covered every area of configuration. This will save you in the long run.

Client configurations come into play as well, as the user's desktop can be a bottleneck in the environment. The big thing now is that everyone is working from home, so there is a dependency on connectivity from the home to the office. Then, you have a VPN where the users connect to the office from home, which could also slow them down. Understanding these areas as an admin will help you detect what the problem is in most cases.

When site collection admins or developers develop solutions for SharePoint, they can also be bottlenecks for performance. There are best practices they should follow as well. We will touch on them in this chapter, but *Chapter 12, SharePoint Framework*, will explain more about how we support our developers and what we need to ask about in meetings with them.

There are a lot of areas that we will talk about in this section of this book that were not mentioned in other chapters. This is because they are for special configurations or we need to dwell on these topics a little deeper. You will see why I chose to keep these topics separate; I wanted to have room to expand on them.

There is lots to cover in this chapter as we dive into configurations for caching, which will give you some insight into how it can help your users get faster performance from SharePoint. Distributed Cache also helps as the configuration for this service is usually untouched. With this service, there are other caching methods that can really speed up your farm's performance, especially when you're using large files.

So, let's dive into performance for SharePoint!

The client's role in terms of performance

Since the servers provide the services on your farm, we must be conscious of our users and how their desktop is configured and performing with SharePoint. In this section, we will discuss user resources and how they come into play for performance, as well as what settings can really bring down user responsiveness from the desktop.

Most users that work remotely believe they do not have the right tools to get the job done from their home. Positioning employees so that they perform well is very important. In some cases, it's crucial, depending on the company and the position the employee holds. If they have performance issues, we have lost the battle again. The key thing we want for our home users and on-premises users is a great overall employee experience when working.

The desktop is the first key to successful performance on your enterprise network and cloud solutions because it supports your users at a personal level. This is their source of power and where they work every day. One thing I believe is that a SharePoint admin should understand all the clients that attach to the sites and services SharePoint offers.

Client machines can be laptops, desktops, tablets, or mobile phones. The operating systems that are used on them can be either Linux, Apple, or Windows, with all different versions and flavors available. I believe that, as a company, we should be giving out those systems and not having a user go buy a system to use on our networks. The reason why we want to have more control over these clients is due to governance, speed, and performance. Compromising those areas will cost you in the long run.

We also need to know about these so that we can support the environment, which makes us a special breed of admin. The reason why I say that is that SharePoint admins deal with identity, networks, servers, the web, and databases, and that is on top of managing services and content within the platform. We need to have a vast amount of knowledge to support our farms.

When supporting connections across the internet, there are many of client hardware configurations that can make a desktop respond quickly or slowly. When your desktop team is configuring for Microsoft 365, for example, and connecting to the cloud, we would want a fast network speed. We can key in on a few things regarding this topic, but I am just going to key in on the following areas in this section:

- Enterprise network speed
- VPN choice
- Geolocation of the data center
- User's internet speed (home network)
- Desktop configuration

A user's desktop in a large enterprise – and even a small enterprise – should have the resources available to support the workload and connectivity speeds needed for the user to complete their daily job. The network team should have enough equipment and local locations to support the number of users that will be connecting to the network. This would mean that technical resources need to come up with configurations for networking components, servers, and PCs and/or laptops that fit the person's need based on their job description.

If you want to have users test their connectivity to the Microsoft 365 cloud, there is also a Microsoft 365 connectivity test. The reason I am mentioning this is that you could be standing up your SharePoint 2019 server in a hybrid configuration. These tests need to be carried out to ensure connectivity to the cloud works as well. As far as SharePoint 2019 On-Premises goes, this all depends on the data pipes open to the user. To learn more about this tool and this connectivity strategy, please go to <https://docs.microsoft.com/en-us/microsoft-365/enterprise/assessing-network-connectivity?view=o365-worldwide>.

Note

To test client speed, have the users type in the words *Speed Test* in Bing; they will be prompted to start a test from their location.

When evaluating network connectivity, the equipment being used matters. Creating different configurations of machines can mean different behaviors occurring when they're being used. So, if someone is a developer and needs to run VMs on their machine, you may want to give them a machine that has more RAM and CPU than a normal user would need. This could mean having a four-CPU machine with 32 GB of RAM, as an example.

This configuration could also include other areas of concern, such as disk space. We should choose the right disk space for the user, be it for a laptop, desktop, or Windows Surface machine, which are very good as well. With that, we should also have the maximum speed possible from the NIC card on the devices and/or a speedy wireless network connection on the hardware. When the client machine connects to the network, we want the fastest responses to the network and, in turn, we want to have a network that supports fast speeds for the best response back to the client machine.

When you are hosting SharePoint or using Microsoft 365, you should post hardware requirements to the users of your service. The issues that come into play include that you may not be able to force someone to use a certain type of laptop or desktop, or even a mobile device in some cases. With that, the internet service speed that comes with the customer's mobile carrier also makes a difference, as well as where the mobile device is located.

So, in this case, not much can be done because you can't force your customers to buy a certain machine or a certain internet service. At this point, we just have to support the users in terms of what they bring to the table and if they do not use the minimum required hardware, we need to explain that to them when they call in for support. There must be expectations for connectivity, especially antivirus support for those client machines.

There are some things we need to be aware of when configuring a desktop, especially for SharePoint. SharePoint is a site, but there are things we need to remember. The following is a list of applications you could set up for the employees of your company:

- Syncing from SharePoint to the client device for offline access
- Syncing with Libraries and OneDrive
- Outlook calendar sync
- SharePoint Designer
- InfoPath Designer and its services

- Microsoft Project
- IE and browsers

Special configurations such as syncing content from SharePoint to desktop can be cumbersome. In SharePoint 2019, there have been big changes to make this process faster and more reliable. By using OneDrive Sync instead of Groove, like in older versions of SharePoint, we can see major differences in the process for offline files.

Most organizations I have been with have a terrible time managing their VPNs. I have had so many performance problems using Remote Desktop Manager and connecting and managing multiple servers. I can only imagine the problems that users have gaining access to the enterprise network and utilizing applications from within.

Although we believe the VPN is the only issue when using a VPN, there are other factors that add to our bandwidth at this point. This includes the VPN's software performance, the servers we connect to to establish a connection, and our authentication provider for the network.

In most cases, your VPN is establishing an authentication session with your authentication providers. The last client I worked with used Okta. So, as you are authenticating, you are establishing authentication with Okta and, in most cases, using two-factor authentication to finalize that connectivity. This all takes time and synchronization. The speed of the transactions is based on the applications and servers supporting the process.

With those processes comes the factor of the location of your data center, which can influence very heavily how the user connects to the VPN. At this point, the VPN is most likely not load balanced, meaning that any user can make a choice to use any VPN. So, by chance, location A could have 50 people connected and location B could have 250 people connected.

Having multiple sites does help support downed sites where the network is not functioning. This gives the user the choice to change locations based on their experience. If I were a user, I would test all possible locations to see which one works the best. Just because some VPNs are closer to your current location may not mean they run the fastest for you.

You also can consider switching virtual desktops running in the cloud as a solution to bypass some of the issues you may have due to different user incidents. Even your SharePoint servers can run in Azure or another cloud platform that is local to the support of those virtual desktops, which changes the game in a lot of ways in terms of performance. At this point, the performance, stability, and consistency of configurations would be the same using this method. Maintenance and other administrative processes can be run across those resources consistently to bring a similar experience for the users.

Client resources support the user but also run applications that developers create. So, let's talk about developers and their responsibility in the SharePoint environment.

The developer's role in terms of performance

As a rule, all developers should follow best practices when developing code in SharePoint. There are so many ways that code can affect performance and cause other issues with the security and stability of the farm and sites within SharePoint. Developers must be careful to use best practices and make sure to dispose of objects when using assets within the structure to run processes.

The Dispose Checker tool is used to make sure all locked objects that are used while processing a developed solution are released and not locked or in a process where they can cause looping. Solutions should be checked by admins using this tool to make sure these solutions are indeed releasing objects. Solutions that do not release objects cause memory leaks, which can cause your servers to slow down and their performance to degrade. Sometimes, these types of errors are hard to find and take a lot of troubleshooting and skill.

As I have already stated in this book, it is important to have a separate development farm, which is the best solution if you have developers that use the system daily or even in situations where we have one solution being developed for a company. You do not want any developers working on production systems, even if it's just performing a workflow process in SharePoint Designer. It is best to have them outside of the production farm where they can test and run the customization. I've stressed these best practices many times over the course of this book. This is because I have seen that most companies do not support dev and test environments as they seem to think it's a waste of resources.

We will dive into the SharePoint framework in the final chapter of this book, where we will provide more details about developer responsibilities and what you need to be aware of as a developer in a SharePoint environment.

Farm administrator tips

The responsibilities of a farm administrator are many, as stated previously in this book. We support a varying amount of technology as a SharePoint admin, depending on the size of our farm, what applications are integrated within the environment, what type of authentication we use, and our disaster recovery capabilities. These are only a few things we support on a day-to-day basis.

Supporting SharePoint farms in an environment really is downplayed by companies, management, and others I have encountered as part of my 15 years in my SharePoint career. It really baffles me how SharePoint will be used as a centralized repository for documents but is still not given the priority of a tier 1 application in the enterprise.

I have also seen where a farm administrator is supporting a huge farm with three app servers, four web frontends, and redundant SQL servers, and also provides support for many users, including authentication integration, all by themselves. Yes, if you implement SharePoint correctly and it cruises along for 6 months, that is great. The problem comes when there is an issue or there is a big need for support. How do you support that environment and troubleshoot at the same time?

When supporting SharePoint Server in the cloud or on-premises, we need to make sure we have the staff in place, full time or part-time, or a contractor to help handle anything that comes at us. We need to be able to support our environment with the best support possible while utilizing multiple people. Even in this case, one other admin is always great to have on board. The cost of SharePoint going down definitely outweighs paying one extra person to watch over the farm.

This is also true for performance as areas of administration should be separated, depending on the size of your farm. I know that in my last big SharePoint migration, I was a team of one managing a 15 TB migration, user issues, and the administration of two environments while moving from one cloud to another cloud provider. I did it and was successful, but it cost me a lot of sleep and time away from my family.

The performance of your environment is very important and in my situation, I did not have time to worry about performance or even about whether the farm was having issues. Sometimes, I didn't even have time to help users fix issues they were having within site collections. This made me prioritize each issue and fix them as they came to the surface.

If it was something quick, I did it quickly, but other than that, performance was only something I looked at now and then. If a person could connect, that was enough for me, depending on the situation. If the situation was that one user was having performance issues, then I would put that on the back burner, but if there were several users having issues, then it was bumped up in terms of priority. I had to really work hard and fast, document those issues, and prioritize to make this work.

So, in the vein of giving you thoughts and ideas on how to manage the performance of a SharePoint farm from a farm administrator's perspective, I have put together a list of proactive steps you can take to care for your environment before you release it to the users.

Some of these have been mentioned over the course of this book, but I will explain them in a little more detail in this section. There are many ways to configure this environment and you really do not want to miss anything. So, please take the time to review the expected results so that you can find the solutions and configurations that work for you in your environment.

Load testing

If you have tested and constructed a load test with Visual Studio before, you will have noticed that you get some much needed verification in terms of how the farm will support your user base. It also gives you the opportunity to see how your server resources respond as if users in your company were using the farm on a regular basis. These load tests are essential in finding out performance issues before they happen. These tests help you tune your farm and server resources so that the farm responds to the needs of your users. Always remember to run these tools after hours and/or in a segregated environment.

There are two types of Visual Studio load testing toolkits. One is Visual Studio Online, while the other is using Visual Studio 2013 behind your firewall, which is a tool you can use for on-premises environments. You can use the Online tool with your on-premises environment, but the farm must be accessible from the internet:

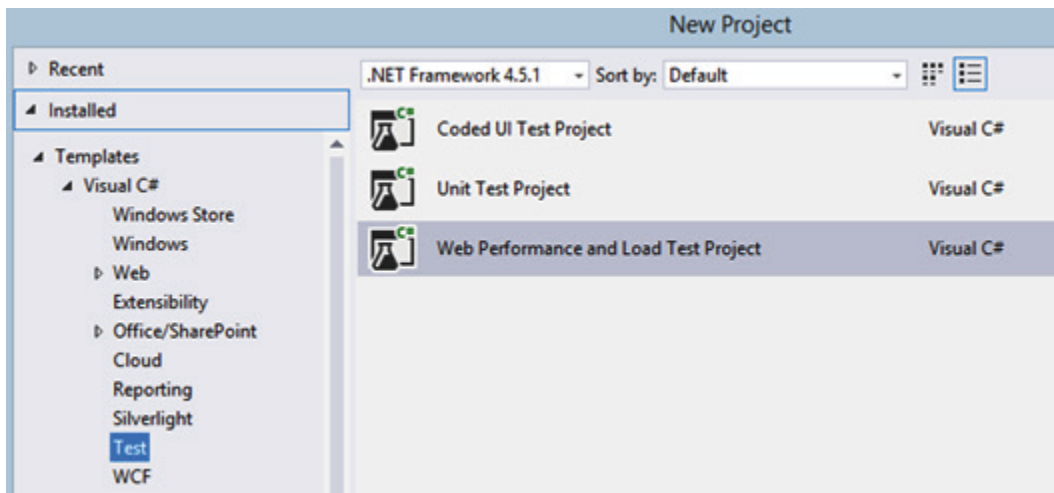


Figure 9.1 – Creating a new load project

Using the load test as an example, you can easily get your farm set up and configured. You can migrate or create new content within sites so that you can use the load testing tool to imitate a user by recording actions as a video screen capture. The capture then reproduces these actions, such as Power Automate actions, in the cloud to create sessions within the environment that simulate as many users as you like. In the following figure, we can add a user count to simulate as many sessions as we need for testing. We can then bring them online in certain scenarios we may find helpful for testing:

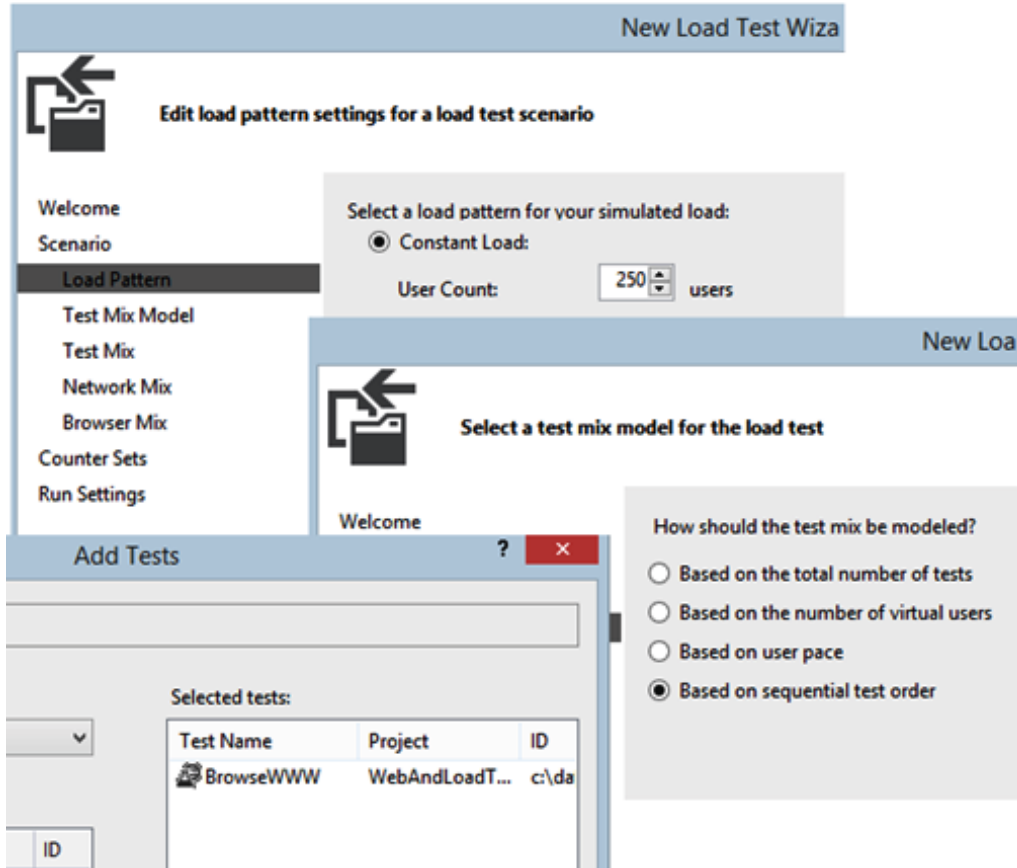


Figure 9.2 – Load testing options

When recording your steps, you can go to different sites, download documents, upload documents, and even test solutions and workflows if you like. Once you've recorded your steps, you can load as many users as you want so that you can perform those same steps as many times as you have users. This gives you a real-time test of your environment based on server resources using solutions that your company may use every day. Configure the options shown in the following screenshot to capture any URL criteria and validate error patterns:

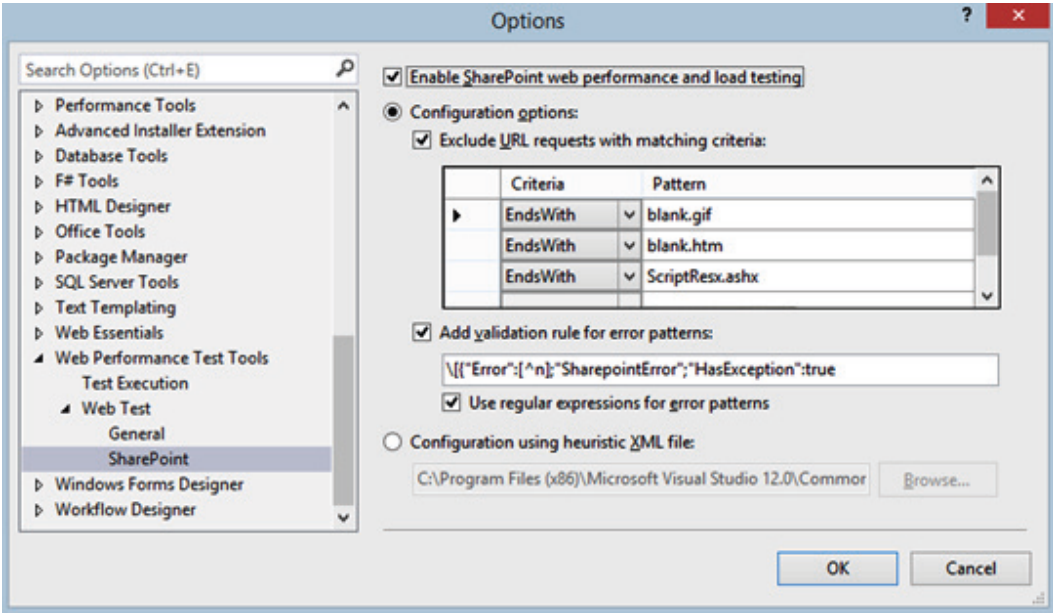


Figure 9.3 – Configuring the options

So, if you realistically have 500 or even 1,000 users, you can load tests using these fictitious user simulations by using a load test script against your farm and sites. When recording these users, who are running your script using the Visual Studio tool, you can record the performance of your servers in real time. This will give you a record of what the server response is as the process runs. You can also customize what processes you grab while the load test script is running to grab what you need or think is necessary. The performance data will be captured during the testing, which you can then export and analyze.

There is also an onboarding process as you can add to your steps at the beginning, which onboards the users based on a certain increment of time. So, if you want to have the first user onboard and start the load testing script, you can stagger the other users by a set time interval. At this point, you could choose times such as 1 minute or even a few seconds. This is when new users jump on board the process and run your load test script. This also tests how many concurrent users the farm will support, as well as how many users can be running scripts at the same time.

I wanted to make sure I shared this tool because lots of people know nothing about it. This process helps you baseline your servers and gives you reports on the different processes running in the environment, as well as information about how the server resources are responding. At this point, once this load test has been successfully run, you can analyze the data you've collected and tweak those areas of concern before running the test again.

This will save you so much time trying to tweak performance and getting ready for Go Live day. There is no need to guess how the servers will perform because you are proving how they will perform with these tests. However, you really want to use content from your environment, and even some developed solutions in your environment, to get a real feel of how these servers will perform. Doing this early in your build process once you've gathered content to test will give you a head start on your server resource configuration. If you want to run against your dev, test, and production environments, then do that. At this point, production is what you really want to understand because that is where the bulk of your users will be using SharePoint the most.

Load testing link: <https://marketplace.visualstudio.com/items?itemName=SharePointTemplates.SharePointLoadGenerationTool>

Warm-up scripts

There is something about being the first person to come into the office in the morning – especially when you're hitting a SharePoint site. Users want instant results and with SharePoint, if you are the first user, then sorry, but you must wait. Application pools take time to spin up. It's like you using the sleep mode on your computer. Even when you hit the power button or the keyboard, the computer still takes time to come back to a point where you can use it.

This is where warm-up scripts come into play. These scripts work on a scheduled basis, depending on the person who wrote the script. It could also be based on a certain time in the morning you have it run or based on server resources or IIS components. They are used to keep sites in SharePoint warm by keeping the application pool fresh and ready for a user to render the site.

Usually, the first person to hit a site in the morning has to take on the responsibility of the application pool being slow to spin up, which creates wait time for the site to come up for the user. Instead of having them wait, we can add a warm-up script to keep the application pool fresh and readily available so that no one ever has to wait for the site to come to life. This requires either scripting and/or Windows Server scheduling to keep this script active.

To learn more about warm-up scripts, please go to <https://gallery.technet.microsoft.com/office/SPBestWarmUp-Warmup-e7c77527>.

Storage

Better known as disk space, this is the next in line as disks can cause slow responses when you're reading or writing data to SharePoint. When we say reading and writing to SharePoint, we really mean SQL Server because that is where all our content, configuration, and services live. We would be more concerned about this on a SQL Server database resource than any other server role. The faster your disk can read and write, the faster information can be relayed back to the user.

We need to choose the proper storage for the proper server resources and, in the case of SQL, the proper components to house our databases. When looking at Web and App servers, you should use a disk with good performance since our operating system, logging, and search indexes will play a big part in how this server responds in the farm. Also, you should take blobs and other files that will be added to the server into consideration, as well as the amount of disk space needed to support the servers.

As far as SQL is concerned, we really need to be mindful of what types of databases SQL Server will support, their size, and how they communicate with each other. If we break this down at a high level, we have configuration, search, services, and content. You can spread just these four areas across separate LUNNs or dig deeper to narrow these databases down into more LUNNs. Believe it or not, this will bring about greater performance for the databases and the resources the server consumes to support the farm.

Disk storage comes in many forms. There are companies that specifically make disk arrays with proprietary software to help us manage disks and configurations that support our server and application needs. NetApp is one that I have used in the past that has helped me design storage and supports the SharePoint server farm. Please check out storage companies that may have something to offer you that can bring about better solutions for support.

Disk types are a great way to gain performance boosts as well, with options for SATA, SAS, SCSI, and SSD available. There are many choices, all of which bring different methods of high performance and specific ways to bring stability to your server. We also have options for RAID, which brings data protection options into play. There are a few different options here, including ones for RAID 0, 1, 5, 6, 10, 50, and 60. For more information, please go to <https://www.dell.com/support/article/en-us/sln129581/understanding-hard-drive-types-raid-and-raid-controllers-on-dell-powerededge-and-blade-chassis-servers?lang=en>.

More information on Azure disks types for cloud configurations can be found here. However, they come at a cost: <https://docs.microsoft.com/en-us/azure/virtual-machines/disks-types>.

As you configure your servers, you also need to make sure **ALL** the logs within SharePoint and SQL Server are moved to a separate drive other than your C drive. This can cause servers to stop working altogether. Move IIS logs, especially when you have a large user base. SQL Reporting Services and other integrated applications also have logs. Move them to a separate drive and make sure the drive is big enough to hold your logs and the search index for the farm. Size is important!

The following link talks about Microsoft's recommendations for storage: <https://docs.microsoft.com/en-us/sharepoint/administration/storage-and-sql-server-capacity-planning-and-configuration>.

Quotas

As we set goals to keep our content at a certain limit, we need to make sure we implement quotas. Site Collection Quotas play a part in the storage's configuration as well. Quotas help you set limits on how much content a user can have in a site collection. There are thresholds you can set here that will help warn users using that site collection that they may be running out of space.

Microsoft has limits on what you can set, which could be a 200 GB minimum to a 400 GB maximum. The reason for these limits is to help the environment recover quickly if you have to restore or perform a migration backup and copy these databases to another server or cloud service. The smaller you can keep these site collections, the better off you will be in the long run when it comes to avoiding issues with backups, restores, and performance due to the size of content databases.

Deleting site collections and subsites

Deleting a site collection from a content database can also cause performance issues you may not be aware of. When the site collection is deleted, it may take a while, depending on the size of the sites supported within that site collection. Other users who have site collections in that content database will be affected once you start this process as well.

There are a couple of ways to do this using `Remove-SPSite` and the `GradualDelete` parameter. When you delete site collections all at once, SQL Server may take some time to process the request, depending on its size and how many databases you are running on the server, as well as the RAM and CPU on the server resources. Using the gradual delete option will put this process at a lower priority so that it does not affect the performance of the server.

Some recommendations when doing this are as follows:

- Run the deletion over a weekend, which would alleviate the issue of other users being affected.
- When setting up the farm, make a rule that all site collections must have a one-to-one relationship with a content database (this helps with restoring processes).
- Move the other site collections in the content database to a new content database if there's more than one site collection per database.
- To recapture the disk space after deletion, run a shrink on the database and log files.

Deleting subsites is done within your site collection. Sometimes, these sites get very big and take up a lot of space within a site collection. At this point, you can see if the site is really needed, move content from this site to another site, or upgrade the subsite to its own site collection. This helps reduce the storage in a site collection as well.

As a site collection admin, you now have the option to create site collections. This is a new feature that was made available in SharePoint 2016 called Self-Service Site Creation. This is different from what you are thinking, because now, we can make web applications use this feature. However, the feature has gone further and lets site collection admins create their own site collections. This does take coordination, documentation, and database management, so make sure to communicate when and if you have these features activated.

RAM

As you set up your server resources, RAM is another area of concern as you will want to make sure you have enough RAM to support the server resources for the farm. Do not use minimums as your point of reference. It is better to test the load on the servers to see how they respond. There are many dynamics that come into play here, such as the following:

- How many web applications are you running?
- Are you running Host Named Site Collections?
- How many content databases are you running?
- How many users are connecting to the farm?
- What processes are running?
- How heavily used are those processes?

There are probably more things you can consider, but these have been mentioned to get you thinking about how to scale your environment with memory so that you do not revisit this right away.

Virtual environments

When setting up my environment, I used VMs within my environment to run all the server resources. One thing you want to make sure of is that you do not want to run RAM dynamically. This causes lots of issues with the servers and is not supported by Microsoft. They will basically stop working with you if you are running your farm with this configuration.

Another thing to be mindful of is the introduction of Distributed Cache. If you have a dedicated MinRole running dynamic RAM, this would negate the use of this service as this has to be configured as static. This is because the RAM cannot fluxgate. Remember to set your Distributed Cache size to an optimal setting. You can set Distributed Cache to a maximum of 16 GB.

More information on this can be found at <https://docs.microsoft.com/en-us/sharepoint/install/deploy-sharepoint-virtual-machines>.

PowerShell Jobs

New to the scene, or somewhat new, are PowerShell Jobs. If you come from a Unix or Linux background, then you will be familiar with these types of processes. With PowerShell, there are two types of code that can be executed:

- Synchronous
- Asynchronous

When using synchronous execution, PowerShell will execute code in the script one line at a time. It will complete each line of code before it starts another line of code. This is usually how I see admins run code so that there is order in the code so that it can complete successfully. It's usually an easy way to write something quickly and think out the strategy in some type of order, while not really taking advantage of the performance of server resources.

When creating scripts, you may want to consider using asynchronous execution and a concept called Jobs. I used a product back in the day called WinCron, when I used to do a lot of SQL and Windows Server automated processes. This type of processing using PowerShell seems to be similar. Jobs are great for performance only when a script does not depend on the results of a prior execution in the code. They run in the background and don't interact with the current session.

The following are some parameters you can use when creating jobs:

- **Start-Job:** Starts a background job on a local computer.
- **Receive-Job:** Gets the results of background jobs.
- **Stop-Job:** Stops a background job.
- **Get-Job:** Gets the background jobs that were started in the current session.
- **Wait-Job:** Suppresses the Command Prompt until one or all jobs are completed.
- **Remove-Job:** Deletes a background job.
- **Invoke-Command:** The `AsJob` parameter runs any command as a background job on a remote computer. This command also runs any job command remotely. The `Start-Job` command can also be started remotely using `Invoke-Command`.

To learn more about PowerShell Jobs, take a look at the following links:

- https://docs.microsoft.com/en-us/powershell/module/microsoft.powershell.core/about/about_jobs?view=powershell-7
- https://docs.microsoft.com/en-us/powershell/module/microsoft.powershell.core/about/about_remote_jobs?view=powershell-7

Distributed Cache service

When configuring SharePoint server, you will notice that Distributed Cache service is installed on every server you installed SharePoint on. During the installation, if you do not want a server to be updated with the service, use the `skipRegisterAsDistributedCachehost` parameter when creating a new configuration database. Distributed Cache supports the following caching functionalities:

- Claims-based authentication
- Newsfeeds, micro blogging, and conversations
- OneNote client access
- Security trimming
- Page load performance

This service can be run on any server and can be run in dedicated server mode or in collocated server mode. In dedicated mode, all services other than Distributed Cache are stopped on the servers that run Distributed Cache. In collocated mode, the service can run together with other SharePoint services, and it's up to you to manage which servers the service was started on. Microsoft recommends using dedicated mode when you deploy the service.

If this server is not configured properly, you could experience a serious performance hit. We need to figure out the capacity for this server so that it can support the service and how we want to install the service so that it runs within the environment. Here, you can look at the number of users that will be supported and see that, based on the number of users we have, we can determine how Microsoft considers your deployment size. The basic minimum memory for a SharePoint server in a farm is 16 GB. We want to make sure that the size of the server is correct so that we do not have any misconfiguration issues with this service.

If you have less than 10,000 users, then your farm is considered small by Microsoft's standards. If you are running up to 100,000 users, then you are looking at a medium-sized farm. Large farms contain up to 500,000 users. You should look at how much RAM should be configured for your service based on size. 1 GB would be plenty for a small farm, 2.5 GB would be great for a medium-sized farm, and 12 GB would be fine for a large farm.

In a small farm, you have the option to use a dedicated server or collocated server configuration. Medium-sized farms would be best run using a dedicated, but for large farms, you would need to have two cache hosts per farm. When running Distributed Cache service in a collocated configuration, you cannot run Search Services, Excel Services (2013), or Project Server Services on the same server.

Configuring Distributed Cache service is easy, but you really need to understand how to configure the service. To configure the service with any type of command in order to, for example, change the memory allocation, you would need to stop the service first to complete the changes and then start the service again.

From my experience, the best configuration for performance is to use dedicated server mode to run the Distributed Cache service. This takes on the burden of processing the web frontends and is recommended. You can run in collocated mode if you want to, but again, there are some services that cannot be run from that server when you're using that method.

To find out more, please go to <https://docs.microsoft.com/en-us/sharepoint/administration/manage-the-distributed-cache-service>.

Request Management Service

I have not seen this service used in any farms that I have supported, except when the engineer was trying to use this to route incoming requests. It was failing and was not a good choice for this small farm. This service would be better used in larger farms where there is a need to route traffic. This is because there could be latency if SharePoint were used natively to route traffic.

This service is used to do the following:

- Route good requests to available servers within the farm.
- Deny requests entering a SharePoint farm that may be harmful.
- Optimize performance by configuring rules manually.

As an example, if there was a request coming in for an available web application and your web frontend servers were busy, the service would choose the best performing server at that time to route the traffic to that better performing server. The request manager provides three functional components:

- Request routing
- Request throttling and prioritizing
- Request load balancing

The service also provides manageability, accountability, and capacity planning in order to support specific types of services, such as Search, User Profile, and Office Online Server, which means that SharePoint doesn't determine where the request needs to be routed. This makes routing less complex and the service can locate problems within those servers that may be failing or running slow.

The Request Management Service can also be scaled out as needed so that as an admin creates and implements those routing associations in the servers in the farm, the load balancer can quickly determine and load balance at the network level.

The service can be started within Central Administration or by using PowerShell. You can use the following parameters in PowerShell to change the parameters within the service to change the properties of the request management service:

- `RoutingEnabled`
- `ThrottlingEnabled`
- `Set-SPRequestManagementSettings`

The service can be run in two different modes. The first is in dedicated mode, where the web frontends are dedicated exclusively for managing requests. These servers would be created in their own farm, which would be located between the SharePoint farm and the hardware load balancers.

The service can also run in integrated mode, where all the web frontends run the request manager. All web frontends means all servers, as in APP and WFE. All the web frontends receive requests from the hardware load balancers and then determine where the request needs to be routed.

Using this service takes a lot of planning and configuration. You do not want to use this service on smaller farms but on large farms where you need this type of dedicated service routing. Once the service has been started, it adds information to your content databases. Without the service, this content database will be out of support in a new farm.

I have seen some weird behavior when moving a content database from one farm with request management to another farm without the service. You must be careful where you start because it may impact you once you migrate. We noticed that requests that were made to sites that had site collections from a farm with the service running were trying to route to different web applications, even when we entered the right URL in a new farm without the service.

When I worked on a project where the engineer was using this service, we ran into some issues. I was told by a well-known SharePoint architect to not use this service at all. He said he had not seen it used before and that there was no legitimate rationale for using it right from the get-go. He also said that there had been a lot of bad implementations when using this service, though it is an option you can use for performance if you dare.

To find out more, please go to <https://docs.microsoft.com/en-us/SharePoint/security-for-sharepoint-server/configure-request-manager-in-sharepoint-server>.

Document size

When determining document sizes that could potentially be used within your environment, note that they affect many areas. One of these areas is performance, which we will talk about in more detail in the next subsection. These documents can also be affected by search settings. I believe lots of people overlook this setting and then notice they are limited by the results they get from the search.

The max document size in SharePoint 2019 Server is 15GB. The setting for Document Size within the Search component, especially when large files are used, such as Word and Excel files, is set out of the box at 64 MB. This setting can be set to a maximum size of 1 GB if needed on both Excel and Word documents. You will capture more metadata on these large files and the search results will produce more relationships for user search results.

This setting can only be completed using PowerShell:

- `MaxDownloadSize`
- `MaxDownloadSizeExcel`

Use these commands to maximize the document's crawl size. This is explained in more detail on the Software Boundaries Microsoft page: <https://docs.microsoft.com/en-us/sharepoint/install/software-boundaries-and-limits-0>.

Blob Cache

One of the things you should do when planning your farm is look at the file sizes of the documents that you will be supporting within the farm. Meetings with users should have given you some clue of what is being used now and what is being planned. If your users plan to upload large files, first, you need to make sure your network can support it. You do not want to have your users uploading 1 GB files over a 100 MB network.

Blob Cache helps with finding the easiest ways to bring performance to your farm, especially for those farms using large files within your sites. The new maximum for the file upload size for document libraries is 10 GB, while list item attachments can be 50 MB in size maximum in SharePoint On-Premises. Microsoft 365 is 15 GB for files in document libraries and 250 MB for list attachments. By reviewing those size limits, you can see that 10 GB is a pretty large file. Processing those files for a user to view in the browser would be pretty process-intensive and heavily dependent on the user's connectivity to the farm.

Using Blob Cache can help you by providing a separate flat drive space (not a database) to hold all those large files so that when users request them, they are pulled from the drive space and not placed within the content database. The blob storage space is located on SharePoint servers and you need to make sure you have storage to support those files.

When using this method to support those files, we can use a configuration where the content database would hold the site collection, which would then associate all the document's meeting certain criteria for the blob and its size to a link to the image or document that is larger than the limitation we set. Users would request that content using the same user interface, but the content would be rerouted so that it can be rendered from disk from the Blob Cache location.

There are many third-party companies that offer Blob Cache solutions, such as AvePoint. Storsimple is a product from Microsoft that also works with on-premises SharePoint environments. You can find out more about this solution at <https://docs.microsoft.com/en-us/azure/storsimple/storsimple-adapter-for-sharepoint>.

Microsoft introduced this feature in SharePoint Server 2019 and can be found within the Manage Web Application area of Central Administration: <https://thesharepointfarm.com/2019/05/sharepoint-2019-blobcache/>.

Other resources:

- Caching and performance planning: <https://docs.microsoft.com/en-us/sharepoint/administration/caching-and-performance-planning>
- Cache settings configuration for a web application: <https://docs.microsoft.com/en-us/sharepoint/administration/cache-settings-configuration-for-a-web-application>

Object Cache

As you saw in the installation setup for SharePoint, we have dedicated cache accounts called SuperUser and SuperReader. These accounts support the Object Cache, which stores properties about items in SharePoint Server. You cannot use out of the box accounts because of check in/check out and claims authentication issues that will arise. The service is used as part of the publishing feature and helps reduce the load on SQL servers to improve performance. These accounts must be set up; otherwise, your SharePoint farm can and will come to a complete stop one day with no warning.

Search Services

As part of SharePoint Server, there are services that provide search results based on the content that's been crawled. This product is called Search Services and we talked about it briefly in *Chapter 6, Finalizing the Farm – Going Live*. Some of this information may be redundant but it's good to recap at this time. To make content available based on certain criteria, a user associates metadata or column information within content that is stored in SharePoint sites. The crawler function within Search Services runs the crawler process and finds all the metadata needed to index that information for users to search and find the results of a search. Be sure to stagger your search crawls across sites so that they finish processing before you move on to the next scheduled site for crawling.

Choosing physical or virtual servers for this service is key as this server can be either. If you have a large amount of data and are planning to expand even more, then you may want to consider using a physical server for this service. Cloning, as we talked about previously, will help in defining the components of Search Services for specific server resources, which creates better support for this service.

Isolating Search Services would be yet another way of helping the performance of a SharePoint farm. This is because this service is very intensive on RAM and CPU. Search Services can take over your server because it requires the resources to crawl through all your content. Remembering to divide the search components into separate servers is key as well since they can be spread out among server resources.

You should isolate these processes either on several servers or a couple of servers. However, most importantly, you should configure these services so that they only run on application servers and not the web frontends where users request access to web applications. The services can be split up, especially when you need redundancy.

If you have more than 10 million items, you must clone your search services, which would make them redundant and boost performance for the service as well. This is the most intense service you have, and it can make or break your farm. The faster you can crawl and gather information, the better the results for your users. I haven't covered a lot on search in this book, but please research further if you wish to make this service stable.

To find out more, please go to <https://docs.microsoft.com/en-us/sharepoint/install/software-boundaries-and-limits-0>.

Excel Online

As you may have noticed, Excel Services is not listed in our services for the farm anymore. This service has been moved to Office Online Server and is now called Excel Online. This is a nice move on Microsoft's part. This service, especially when used heavily, needs some isolation as it can weigh heavily on the server's resources.

Another thing I used to see all the time is that no one took advantage of the segregation of Excel Services throughout the farm. In some cases where this service is used heavily, you want to use Excel Services in designated locations of a web application or even segregate it to a separate web application, purely for the purpose of big data and reporting. This takes the service out of the most used areas of the farm and isolates it in one web application, which then has its own IIS site and databases associated with content and resources.

The reason I would do the separation at the web application level is due to heavily using the service and/or related services. These could be SSRS or other third-party integrations that may need to have separate processing and relationships to services in SQL and SharePoint. These can be separated by server as well since you can integrate SharePoint with several SQL servers if you like. On the flip side, you only need to run certain web applications on designated web frontends to give some good separation of processes.

Some things to think about when configuring Excel Services are as follows:

- Use trusted file locations to segregate the use of this service within web applications. You must specify HTTP or HTTPS in your URL and the location limits where Excel can be used within your farm.
- The service also controls the location type, which could be a SharePoint Foundation location or other location types such as UNC and HTTP.

- Configuring options so that child libraries and directories are trusted within the trusted file location.
- Session management, for timeout settings and request duration.
- Calculating Excel data mode, which can be done against a file. This can be a manual calculation or automatic, except when this is done on data tables.
- External data connectivity can be allowed or not allowed and can be for libraries only or embedded connections.
- A refresh rate for the data can be set. You have many options here.

If you are looking to use Excel Online heavily, look at some of my recommendations to spread out your processes so that they do not collide a create a performance bottleneck. We will talk more about Excel Online's features and its installation in *Chapter 10, SharePoint Advanced Reporting and Features*.

InfoPath

If you are still using InfoPath in your farm for users, this brings up another farm service that gets overlooked as a performance bottleneck. There are areas in Central Administration that control these services and are sort of hidden. I believe most admins just keep the default settings and never look at these controls.

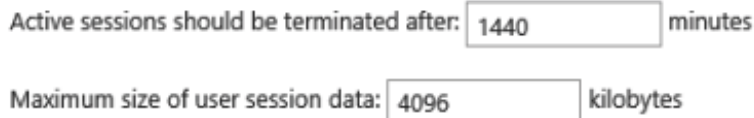
The issue I have seen with this service is the settings that are used to support it. I have seen some InfoPath users or developers, especially those new to InfoPath, create forms that are just one-page forms with many form inputs that collect a lot of data. In the real world, you really want to split your form up and make views so that the data settings in the InfoPath service do not have to be made larger for session data.

In some cases, I can see when you may have to do this, but if you are keying in on performance, you really want to limit that data per session from each user. You also want to watch what connections to services you are using as these can slow down forms, especially when you're querying data when the form is open. As an example, interfacing with User Profile Services can help you auto-fill forms, though this can produce issues, depending on how much data you are autoloading. SQL Server databases can also be used to connect to, but then again, you have to look at how much data you are pulling into the form.

Doing this can delay the form from opening due to the service trying to connect to get the data or user you requested, or even connecting to other resources within the domain. These services can be slow sometimes and depending on how many users are using that form at once, this could be a big burden on the farm and server resources.

Depending on how you create your form, getting data through InfoPath processes presents data when the form is opened, such as a user's manager or phone number. This could also be anything that is related to the user profile or even a separate list or database. This process must go out to that data source, gather the required information, and then load it inside the form.

This process can be quick but also a little cumbersome. So, it is better to load as little data as possible so that you do not have to change your settings and put a burden on the server resources. These are just a couple of tips about InfoPath you should think about as we investigate the settings within Central Administration for InfoPath:



Active sessions should be terminated after: 1440 minutes

Maximum size of user session data: 4096 kilobytes

Figure 9.4 – InfoPath session settings

As you can see, there are many things to consider in terms of the performance of SharePoint. SharePoint has not changed a lot, but you do find some diamond new developments within the structure of the 2019 version that really help change how we configure our servers and manage resources within the environment. Building your farm cleverly and using recommendations from Microsoft, along with following the best practices, helps you get to a point where you can have a solid baseline to support your company's goals.

Farm administrative monitoring

When building and administering a SharePoint environment, you will find you are setting up logging and other aspects that help you report issues and problems. Logging, as you saw when we configured SharePoint, was set up to use a separate disk space so that we had room for these logs to grow and ensured they did not affect our operating system's functionality.

I cannot stress enough that you need to move all logs, even if it is a third-party tool you are deploying, to make sure those logs are moved to a separate drive space. Even IIS falls into this category as those logs can grow quickly, depending on the number of users you have. If you are performing a migration, you will see your logs growing dramatically for IIS and ULS.

Now that our logs have been set up, we need to proactively monitor our SharePoint farm. There are different ways to monitor SharePoint. As a starting point, you can use the Central Administration website, which provides health and reporting features for SharePoint. There is also the System Center Management Packs for SharePoint, which provide out-of-the-box monitoring insights for monitoring SharePoint natively.

Then, there is PowerShell, which may take you some time to get set up. However, it is a very powerful way of making sure your farm services and farm is running well. There are also SQL monitoring tools that you can purchase to monitor the tasks that are being processed on this server, but SQL includes an activity monitor that will feed processes in real time:

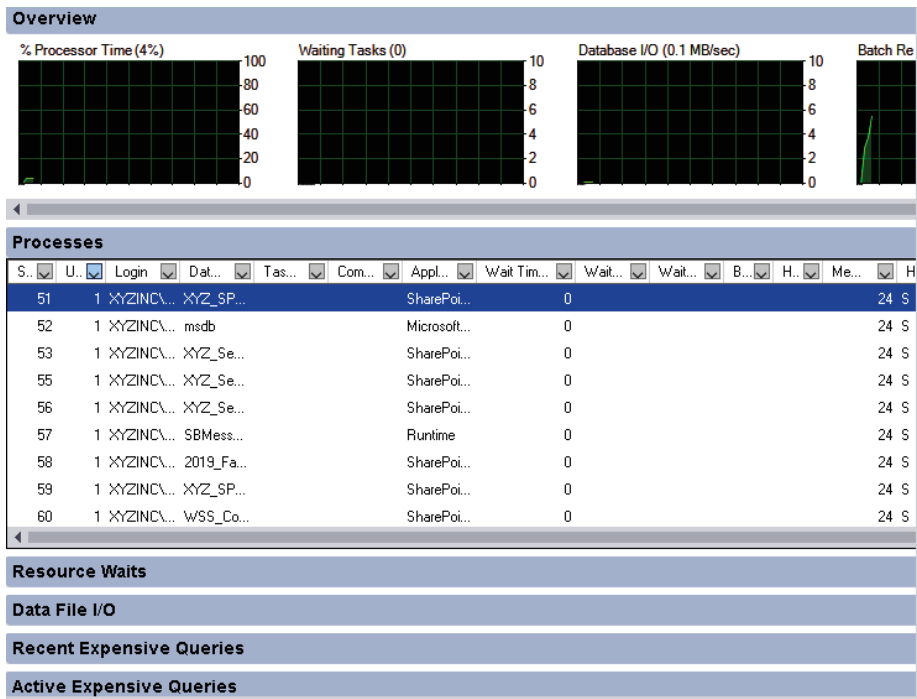


Figure 9.5 – SQL activity monitor

When monitoring SharePoint, there's a host of areas we need to take into consideration:

- **The Health Analyzer:** How to mitigate issues that have been captured
- **Reporting:** Using the reports within Central Administration to find solutions to issues
- Performing regular checks to inspect the current state of the environment
- Defining what is important to your business and what to monitor more frequently

The configurations for logging we set up in the installation are native to SharePoint only. SQL Server is also monitored from a configuration standpoint to help you promote a configuration that supports performance and best practices. SharePoint uses databases that capture logging, as well as diagnostics and usage. There are still server components outside of SharePoint that we use to support troubleshooting and to monitor our services. All of the services we use for SharePoint run on the servers we provision, and how we provision them makes a difference in terms of how the farm performs.

In SharePoint 2016 and 2019, MinRoles come into play. They help us manage roles within our environment so that we can support our server resources. This is because MinRoles limit what services can be run on our servers. These preconfigured and dedicated MinRoles can be added to our environment:

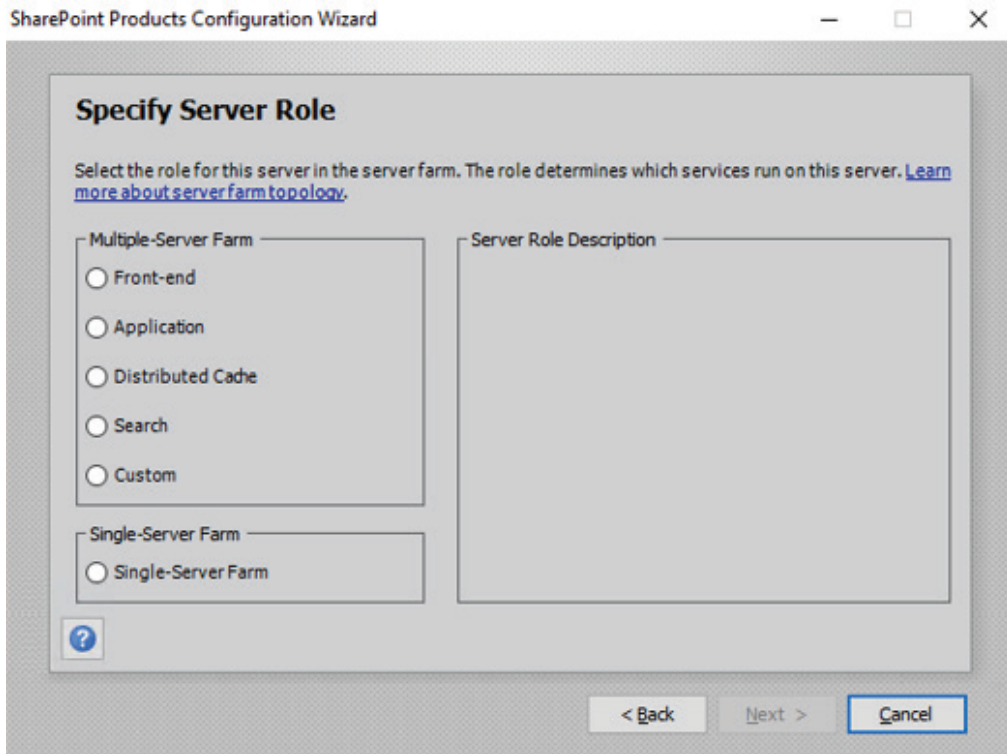


Figure 9.6 – Specify Server Role screen

These were covered in *Chapter 2, Planning and Architecture*. We need to make sure we choose the right MinRole for the server resource. We also have Server Compliance. This is shown in the following figure, which shows the role of the server in the farm. This Central Administration function monitors which services are running on the specific MinRole or server resource. If a server is running a service that is not accounted for by the restrictions within the MinRole, the server will be deemed non-compliant:

Server: SP2019-APP1 | Role: Custom | View: Configurable

Service	Status	Compliant	Action
Access Database Service 2010	Stopped		Start
Access Services	Stopped		Start
App Management Service	Stopped		Start
Business Data Connectivity Service	Started		Stop
Central Administration	Started		Stop
Claims to Windows Token Service	Stopped		Start
Distributed Cache	Started		Stop
Document Conversions Launcher Service	Stopped		Start
Document Conversions Load Balancer Service	Stopped		Start
Lotus Notes Connector	Stopped		Start
Machine Translation Service	Started		Stop
Managed Metadata Web Service	Started		Stop
Microsoft SharePoint Foundation Incoming E-Mail	Started		Stop
Microsoft SharePoint Foundation Sandboxed Code Service	Stopped		Start
Microsoft SharePoint Foundation Subscription Settings Service	Stopped		Start
Microsoft SharePoint Foundation Workflow Timer Service	Started		Stop
PerformancePoint Service	Stopped		Stop

Figure 9.7 – Server compliance

As you can see, there is a column related to compliance. If there was a service that was not compliant on this MinRole, you would see it flagged in this list of services. Note that this MinRole is a custom role, so no service would be flagged for non-compliance. I can change the role by going to the **Systems Settings** menu and clicking on **Convert Server Role** in this Farm:

Role Conversion

Server

SP2019-APP1

Current Role

Custom

New Role

Custom

▼

Figure 9.8 – Role Conversion screen

Diagnostic Logging is a log that collects data that is used to troubleshoot SharePoint farm environments. When you set up logging, you will see there are various ways to capture data. These will be provided in a drop-down list. You can select from a list for the least critical events to monitor in the event log and do the same for the trace log. There are also categories you can select from where there's a list of areas you can choose to report on. Since we configured our logging in *Chapter 4, Installation Concepts*, we will give some background on logging here, as well as what to look for in SharePoint that can help with performance and troubleshooting:

Event Log Flood Protection

Enabling this setting allows detection of repeating events in the Windows event log. When the same event is being logged repeatedly, the repeating events are detected and suppressed until conditions return to normal.

☒ Enable Event Log Flood Protection

Trace Log

When tracing is enabled you may want the trace log to go to a certain location. Note: The location you specify must exist on all servers in the farm.

Path

 Example: %CommonProgramFiles%\Microsoft Shared\Web Server Extensions\16\LOGS

Number of days to store log files

Restrict Trace Log disk space usage
☒ Restrict Trace Log disk space usage
 Maximum storage space for Trace Logs (GB)

Additionally, you may set the maximum number of days to store log files and restrict the maximum amount of storage to use for logging. [Learn about using the trace log.](#)

Figure 9.9 – Log location definitions for ULS logs

When using diagnostics for monitoring, you can select the level of logging you want to perform. If you are performing well and not making any significant changes to the environment, you will want to keep it at a default level, where we are capturing minimal information about the farm and its state. If you are making changes or seeing issues, then you will want to find out detailed information. Here, you would change that setting to **Verbose**, which will create more information in your log. The size of your log will be larger due to those intimate details being captured based on that change.

Some of the best practices for diagnostic logging have been mentioned in this book, but here is a short list to help you remember:

- Update the drive location where the logs are being captured.
- Restrict the trace log disk space's usage (set a quota).
- Back up the logs regularly as part of your server backup.

- Enable event log flooding protection (limits repeating events in the event log).
- Only use the Verbose setting when troubleshooting (more logs will be created and there will be storage issues).

The levels you can set within the diagnostic logging feature limits the types and amounts of information that will be gathered within each log. The level settings for each log are available here:

Event Log Levels:

- **None:** No trace logs are gathered based on this selection.
- **Critical:** This type of information gathering is related to serious errors caused by a major failure.
- **Error:** These messages are gathered based on an urgent condition.
- **Warning:** These messages are gathered based on a potential problem that requires immediate attention.
- **Information:** These messages do not require attention as they are only informational messages.
- **Verbose:** These messages only capture lengthy messages.

Trace Log Levels:

- **None:** No trace logs are gathered based on this selection.
- **Unexpected:** These messages gather only unexpected, assert, and critical message levels.
- **Monitorable:** These messages gather information that limits functionality but does not stop the application.
- **High:** These messages combine all the methods that are gathered at the Unexpected and Monitorable levels.
- **Medium:** These messages combine all the messages that are gathered, except for at the Verbose and VerboseEx levels.
- **Verbose:** These messages combine Medium messages and include most actions. Verbose tracing can contain a vast amount of log messages.
- **VerboseEx:** You can only set this level using the PowerShell `Set-SPLoglevel` command. Microsoft recommends that this level is only used in a development environment. The messages that are gathered here include all trace log levels.

Usage and Health Data Collection is a logging method based on how SharePoint is used from an overall perspective. The information that's gathered here is assembled into a database and placed in the logging folder on the server. This data is used to create the health and administrative reports that are shown on the Central Administration Monitoring page. This includes search usage and performance counter data:

Event Selection

Logging enables analysis and reporting, but also uses system resources and can impact performance and disk usage. Only log those events for which you want regular reports.

For sporadic reports or investigations, consider turning on logging for specific events and then disabling logging for these events after the report or investigation is complete.

Events to log:

- ☒ Administrative Actions
- ☒ Analytics Usage
- ☒ App Monitoring
- ☒ Asynchronous Feature Activation Job Usage
- ☐ Bandwidth Monitoring
- ☒ Content Export Usage
- ☒ Content Import Usage
- ☒ Database Maintenance Job Usage
- ☒ Database Wait Statistics
- ☒ Definition of usage fields for service calls
- ☒ Definition of usage fields for SPDistributedCache calls
- ☒ Definition of usage fields for workflow telemetry
- ☒ Delayed Content Type Activation Usage
- ☒ Feature Activation Resource Usage
- ☒ Feature Use
- ☒ File IO
- ☒ Page Requests
- ☒ REST and Client API Action Usage
- ☒ REST and Client API Request Usage
- ☒ RUM Global Provider Description
- ☒ Sandbox Requests (new)

Figure 9.10 – Central Administration Monitoring page

Usage and Health Data Collection features include health and other services, such as SQL Server, all of which rely on timer jobs. These timer jobs are run on schedules that are controlled within Central Administration. These timer jobs monitor tasks and collect data specific to the timer job's relationship to services. These time jobs schedule how frequently these jobs should be run and how frequently services should be started based on their needs. The SharePoint Timer Service is a service that runs on the operating system and is part of every server in the farm.

You can change the settings for these jobs so that they run more frequently or less frequently. Disabling jobs is only recommended if you really understand what that time job is being used for. In some cases, time jobs are not needed, and we do disable them. As an example, Dead Site Deletion may be disabled because you may not want SharePoint to automatically delete sites. If a site is not being used, this timer job would automatically try to delete the site. It will send you a notification to ask you if the site is still being used. You may not want this type of automatic service on your farm, so you would disable this timer job.

It is also important to run Health Analysis jobs after maintenance so that you can see the effects it has on your health report. The Health Analysis rules verify and update health collections so that if anything is not a best practice, it will post that to the health report page, which is called Review Problems and Solutions. By doing this, you can get the status of the environment and clean up any loose ends.

As part of timer Job management, you can do the following from Central Administration:

- View and modify timer job schedules
- Immediately run a timer job
- Disable and enable timer jobs
- View the status of a timer job
- Find what time job has an association with what web application
- View a timer job's history

Always remember to run `PSConfig` after maintenance to make sure your farm is configured cohesively and successfully. Do not just run the minimum `PSConfig` command; instead, run the full command so that the configuration is fully updated; for example:

```
PSConfig.exe -cmd upgrade -inplace b2b -wait -cmd  
applicationcontent -install -cmd installfeatures -cmd  
secureresources -cmd services -install
```

`PSConfig` finalizes the configurations for the servers and databases, which then get updated. You may see changes in the GUI of Central Administration in some cases or even sites. Next, we will look at monitoring in Central Administration and how that helps us manage the farm proactively.

Monitoring in Central Administration

Health Analyzer within Central Administration is used to view and resolve issues within the farm. Again, Health Analyzer is updated after health timer jobs have been run to trigger the statuses of services within the farm's environment. The rules associated with the timer jobs are located within **Central Administration | Monitoring** and can be edited. These health rules create alerts and give you information about the rule that was run so that you can fix the issue:

Health Analyzer Rule Definitions ⓘ

⊕ new item

All Rules ...

✓	Title	Schedule	Enabled	Repair Automatically
Category : Security (5)				
	Accounts used by application pools or service identities are in the local machine Administrators group.	Daily	No	No
	Business Data Connectivity connectors are currently enabled in a partitioned environment.	Daily	Yes	No
✓	Web Applications using Claims authentication require an update.	Daily	Yes	No
	The server farm account should not be used for other services.	Weekly	Yes	No
	The Unattended Service Account Application ID is not specified or has an invalid value.	Daily	Yes	No

Figure 9.11 – Health Analyzer

There are specific categories a health rule can fall into, and these categories cannot be changed. You can, however, edit some areas of the rules:

- Title of the rule
- Schedule the rule runs on: Hourly, Daily, Weekly, Monthly, or OnDemandOnly
- Enable or disable the rule
- Enable Repair Automatically
- Change the version of the rule
- Receive alerts about the rule once it has been run

You can also change the way the rules are viewed and add more information using a custom view. You can also export this list to Excel or use the RSS Feed for the list. There is also an **Analyze Now** button in those rules that can be corrected through the Health Analyzer. Not all are successful all the time and they may require some manual intervention. The big thing is that Health Analyzer can help identify potential issues.

Monitoring as a Site Collection Admin

Site Collection Administrators are really the key to creating a cohesive environment and supporting the users in that community or department. As a Farm Admin, we are outside of the user community and cannot possibly know everything users are working on in real time or even any time. I often wonder how large organizations go without these roles and expect Farm Admins to know all and be all to everyone. This is especially true for small SharePoint support shops where you have one person supporting 10,000 – 100,000 users, normal administration duties, updates, and mandates from management.

As a site collection admin, this takes all the guesswork from the farm administrator and makes the load lighter. Again, as stated in *Chapter 2, Planning and Architecture*, you need to make sure you provide site collection administrators to your user community. This can be a side job for one person and strictly the only job for that person. In a perfect world, these teams would meet and find out how to best solve problems for the users in that community or collectively with other farm admins and site collection admins.

As part of a site collection administrator's duties, they should be monitoring how the tools are used within the **Site Collection** admin page, under **Site settings**. These tools give them reporting capabilities for storage and other insights needed to manage the site collection. Storage reports in a site collection will give the administrator the total storage being used in the site collection and break out each subsite, thus giving totals for these areas as well. This way, you will know where most of your content is being kept within the site collection.

As a site collection administrator, there are best practices that you need to follow. These play into how the site collection is managed:

- Keep your content under 200 GB unless you're told otherwise by your Farm Administrator.
- Split subsites across site collections when needed to load balance your storage.
- Organize your subsites across site collections using department or project names.
- Do not turn on features you do not need in your site collection.
- Always uninstall third-party features you do not use or have been abandoned.
- Tag content and come up with metadata that makes sense to describe the content.
- Use Active Directory groups within the security model for your site collection.

These are just a few things site collection administrators can do to support their sites based on best practices. This team really helps Farm Admins do their jobs more efficiently and helps mitigate issues within the environment that are site-related. If a farm admin is administering a farm with over 2,500 sites, you do not want them managing the user community as well. Site Collection admins are a plus in this scenario and a recommendation.

SQL Server performance

Tuning SQL Server has a big bearing on how SharePoint will run as an application. This is the backbone of SharePoint and stores all data for the farm. There are outside configurations that help here, such as blob storage, which we talked about earlier in this section. The easiest way to gain performance on your databases is to follow these recommendations:

- Database maintenance
- Dual NICs to minimize traffic
- Isolate Search Indexing

When creating a maintenance plan, one of the key responsibilities is to make sure you have enough disk space to hold backups of the content you are managing in the SharePoint farm. If you do not have enough space, you will not be able to hold backups for all your databases. You also want to use cheap storage for this location, depending on the size of your content and services. If you have a large amount of data, then you may want to use faster writing disks.

When looking at the size of our databases, what could cause the database to grow? What processes would start making our databases get larger? Well, the answer to that question can have many credible sources. Let's look at some:

- SharePoint migrations can cause databases to grow quickly.
- Users adding content can cause fast growth, depending on the users.
- Moving site collections can cause growth in content size.
- User activity can cause growth in the log file.

I have managed small and large farms where I had up to 3,000 site collections. When you look at space, you may need the same amount of content you have at the moment, or double or triple, depending on how much data you want to retain for direct access if something was to go wrong.

When creating a maintenance plan, the options we must run against our database to keep them healthy are to shrink the databases to clean up any unallocated space. This helps keep the databases at their current size when site collections or many documents are deleted. Indexes can then get fragmented, which then can cause performance issues. We can handle those fragmented indexes by scheduling index defragmentation as part of our maintenance plan.

You can create the steps in a maintenance plan and then clean up to delete old backups. This ensures that your drive space is free from old data that may have already been moved to offsite storage. Make sure to keep backups off your C drive where the OS is located. I have often seen times when SQL was implemented with one huge drive. Lots of things can happen in that configuration.

Another way to help with performance is to create separate service user and database traffic. Web frontends and SQL could be routed through one NIC card, while the other NIC card can be used for user traffic. This separates the traffic so that those networks are dedicated to supporting the processes in separate environments. This could be a VLAN or even a physical network.

Choosing a physical or virtual server for the SQL database server would be another way of boosting performance. Physical servers run with better performance and do not have any contention on other VMs or HOST server processes that may be running on the same server.

Troubleshooting

Troubleshooting SharePoint is a task you will fail at many times, but the good news is that there are others who have experienced the same frustration. It is such a big platform and it touches on so many other applications and systems within the enterprise that it takes dedication to support this platform. You must really understand SharePoint under the hood to take the right steps in fixing issues. As you may have noticed, we keep harping on about best practices. If you can keep those in mind as you go through the implementation, you will be able to configure a stable farm.

This section will be light due to the vast arena of issues we could come across and because this could be a whole other book in itself. If you wish to understand troubleshooting in SharePoint, we recommend the book *Troubleshooting SharePoint* by Stacy Simpkins. It goes through many scenarios to show you how to deeply analyze SharePoint issues. It also provides tips on how to figure out common issues within SharePoint.

So, let's start this section by providing a list of areas you should check when you're monitoring your server daily. Performing daily checks and even consistent checks throughout the day, if you're not using a monitoring tool, is recommended. SharePoint can change at any moment, even when you think things are OK. Just make sure you look at these areas on each server and SQL Server at least once a day to verify you have a good standing of the farm, especially after changes and updates have been made:

- Health Analyzer
- Windows Event Logs
- Windows Application Logs
- Task Manager
- Task Manager – Performance
- Scan a recent diagnostic log
- View Administrative Reports

Finding the issue is the tough part of working with and administrating SharePoint. In some cases, these issues are easy, but in others, you will find yourself surfing the net finding information about what others have done to fix the issue. In SharePoint 2003 and 2007, this type of information was not available because the SharePoint products did not take off immediately until MOSS and once that happened, Microsoft had to catch up and post information. In those days, there were not a lot of blogs and support there to help you. You had to work through the issues and fix them yourself.

Now, there is a lot of readily available information and you have many resources to choose from. However, be aware that some of the issues that were fixed may not have been fixed properly in Blog Posts. The first thing you must do is test the scripts you see in posts and alter them as needed. Test the script in a lower-level environment first to see the effects of the script. Do not trust every blog you see that contains scripts and other fixes that, in your gut, do not seem to be correct. Beware of posts that go against best practices and others that may ask you to run a script to update or change a database.

We mentioned some great tools in the previous chapter but did not really dive into how they are used. We will show you the real-world scenarios of how we found the answers to solving issues within the farm. The following tools can help you troubleshoot issues in SharePoint:

- **Fiddler:** Client-side logging software used to capture events with clients connecting to SharePoint
- **Process Monitor:** Logs all processes running on the server and what the process is processing
- **Network Monitor:** Logs all the network activity of the resource
- **ULS Viewer:** Gathers information from the ULS logs and color codes information that may be critical
- **PowerShell:** Can be used to help manage the ULS files by merging logs, starting a new log, setting the log level, clearing log levels that have been changed for VerboseEx, and so on

When troubleshooting the first area, I always check the Windows event logs, either on the client or the server. Most of the time, you will find the issue or a related issue in these logs right away. Sometimes, it can be hidden among many entries, so you must be thorough in your search. If it's a sporadic issue, you will see that it could be one line in hundreds of entries, so sometimes, it's best to recreate the issue and log the first time to see if anything comes up in the Windows logs while using the other tools mentioned as well.

When capturing logs, you want to set your ULS log level to VerboseEx. The first thing you must do before starting VerboseEx is check your drive space. Depending on the size of your farm, you can generate some big logs if you are not careful. Therefore, we have other commands to help us manage these logs instantly.

So, let's say we have an issue we are about to recreate. The first thing we must do is set the log level to VerboseEx, as shown here:

```
Set-SPLogLevel -TraceServerity verboseex
```

This will help us capture everything SharePoint spits out so that we can gather details about anything happening within the environment. Once we start the log at that level, we must immediately recreate our issue. The reason we must recreate the issue is that we want our log to be as small as possible when capturing information about the error. So, let's perform a quick recreation and then start a new log:

```
New-SPLogFile
```

Now, you will need to clear the log level, which means setting the log level back to the default and not capturing verbose logging anymore:

Clear-SPLogLevel

If you are unsure of what server the error is happening on due to it being a service or something you just don't understand, then you can also merge the logs to find errors for the same period of time:

```
Merge-SPLogFile -Path "D:\Output\SSRSService.log" -Overwrite  
-StartTime "06/09/2008 16:00" -EndTime "06/09/2008 16:15"
```

Always remember to put all the output from PowerShell and other growing files (logs) on your D drive or a drive that is always separate from the C or OS location. We do not want to fill up our C drive with this type of information – especially growing files that can fill up drive space quickly and stop the server from running. I have seen many horror stories just on this simple use of drive space.

We could really go into a lot of areas here while going through all the methods and applications we could use to troubleshoot issues, but I believe the best use of your time would be to look at some of the scenarios I have come across in my career and give you those fixes. So, in the next section, we will go through some of the issues I have encountered in the past and tell you how to get past them.

Scenarios and fixes

As part of this book, I wanted to go through some scenarios I have encountered to help you discover how to use the tools mentioned previously. In these scenarios, there will be many different types of issues. This will help you understand what tools can be used to figure out fixes quickly.

Let's go over some scenarios.

User desktop issues during migration

Scenario:

You migrate users so that they can use content from one SharePoint farm (or service) in a new SharePoint farm (or Service) using the same URL and SSL certificates. This could be from servers in one cloud service to servers in another cloud service as well.

Behavior:

Users will see issues when connecting to the site where the site will be blank, never connect, won't come up, and/or spin like it is trying to connect but can't. You may even encounter broken user interface issues, such as the page not loading fully.

Fix:

Clearing the cache on the client machine is the answer to this issue. Clear everything in the browser cache in IE since this seems to be the most vulnerable cache in this scenario. Google Chrome and Firefox seem to work well in most cases, but you may have one or two users who need to do the same in those browsers as well.

You also want to clear your machine cache and profile cache. Some information may be stored that could be corrupted as well. Then, if all else fails, clear your SSL cache in the browser. This seems to resolve the issue for those with stubborn desktop configurations.

Please follow these instructions:

Note

If you are not an admin on your computer, please contact an admin so that they can do this for you.

1. Clear all browser caches completely (if you're using Chrome, make sure you choose all the caches and not just the last 24 hours).
2. In Windows 10, open **Internet Explorer**.
3. Click on the gear icon (tools) and click on **Internet Options**.
4. Click on the **General** tab.
5. In **Browsing History**, do the following:
 - **Delete Browsing History** (select the check boxes in the popup for deleting all types of information).
 - Click on the **Browsing history** settings and open **View Files** (there were still a bunch there when I did this).
 - Delete all those files.

Then, follow these steps to clear the computer's cache:

1. Open **My Computer**.
2. Click the address bar and paste in %USERPROFILE%\AppData\Local\Microsoft\WebsiteCache.
3. Delete everything within this location.
4. Click the address bar and paste in %APPDATA%\Microsoft\Web Server Extensions\Cache.
5. Delete everything in this location.
6. Then, from the command line, run `ipconfig /flushdns`.
7. Reboot your computer.

Site collection issues after migration

Scenario:

You are in the process of performing a database attach migration from an old farm to a new farm, but users seem to be having issues connecting to the site or rendering the site clearly.

Behavior:

The user sees garbage where the site is not easy to navigate and broken images and links are all over the page. They also may have issues connecting to the site.

Fix:

Remove the content database in Central Administration and reset the IIS or reboot the servers in the farm. Reattach the content database to the web application using the GUI or PowerShell. You can also run `Repair-SPContentDatabase` as this resolves some issues once you've migrated over content from another site. These steps have helped me clear issues where the content database seems to not be fully engaged or seems to cause trouble in terms of stability.

Content database migration errors

Scenario:

When creating your farm and adding content databases to a web application, you get an error message stating that the ID of the database is already in use.

Behavior:

When using PowerShell to mount the content database or the GUI within Central Administration, you get an error when you try to add content databases to web applications.

Fix:

Use PowerShell to add the content database to the web application and use a new database ID:

```
Mount-SPContentDatabase "WSS_Content" -DatabaseServer
"DBSERVERNAME or ALIAS" -WebApplication "https://
WebApplication/" -AssignNewDatabaseId
```

SharePoint designer connectivity issues

Scenario:

As a site collection admin, you may see errors like this when you have transitioned to a new SharePoint farm using SharePoint Designer to create workflows and other content:

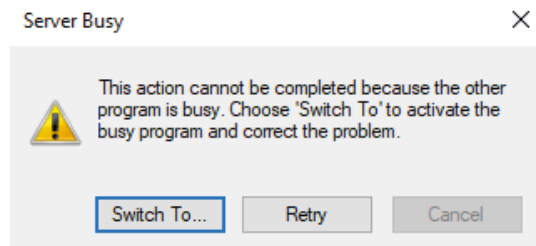


Figure 9.12 – SharePoint Designer connection error

The following is another error example:

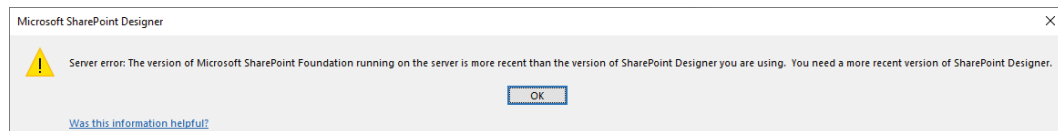


Figure 9.13 – SharePoint Designer – possible connection error

Behavior:

You cannot connect to any sites. Individual sites could be a problem here as well. You may be able to open the site, but no content is displayed in Designer. There could be content but workflows, and lists may be missing. There are many issues that can be caused by a corrupted SharePoint Designer installation.

Fix:

Uninstalling and reinstalling the application is the first test you should do to see if there is just something wrong with the application. If this doesn't work, then you should delete all SharePoint Designer caches. You can do this by following these steps:

1. Open **My Computer**.
2. Click the address bar and paste in %USERPROFILE%\AppData\Local\Microsoft\WebsiteCache.
3. Delete everything within this location.
4. Click the address bar and paste in %APPDATA%\Microsoft\Web Server Extensions\Cache.
5. Delete everything in this location.
6. Then, from the command line, run `ipconfig /flushdns`.
7. Reboot your computer.

Moving site collections

Scenario:

During your migration planning, you've noticed that you have some site collections that are very small and some that are very large in the same content database. You want to consolidate those sites that are smaller into a different content database so that they can grow, and also relieve the space that's been taken up so that the larger site collection has room to grow in the current database.

Behavior:

When you're performing a migration, the worst thing you can come across is several small site collections and some medium-sized site collections in one huge content database where there is one site that is over 100 GB.

Fix:

Migrate the small- and medium-sized databases to other content databases to change the current content database from being very large to being large. This means that small-to-medium-sized site collections could total 100 GB themselves; having another very large site collection at 100 GB or more in size makes no sense to move altogether. Breaking these site collections up gives you a faster migration time when moving a database from one server to another or even one service to another. This also helps with scheduling.

To move your site collections, create a new content database using Central Administration (make sure you document your moves during this process). Move the select site collections to one or many new content databases to ensure they can be moved quickly and easily:

```
Move-SPSite http://webapp/sites -DestinationDatabase
NewContentDb
```

Temp path update for Search

Scenario:

You are getting errors in your Windows logs and you have also noticed your C drive is full on the index server.

Behavior:

After creating and running a search crawl, you notice that the server runs out of disk space. After doing some research, you notice that the location of the growing information is from the Search Temp area, which is located on the C drive. This happened to me after one of my colleagues installed it using AutoSPInstaller.

Fix:

Change the location of the Temp space after installing it by changing the registry settings for these locations. In the beginning, when you created the farm, the installation process provided a screen that many do not pay attention to:

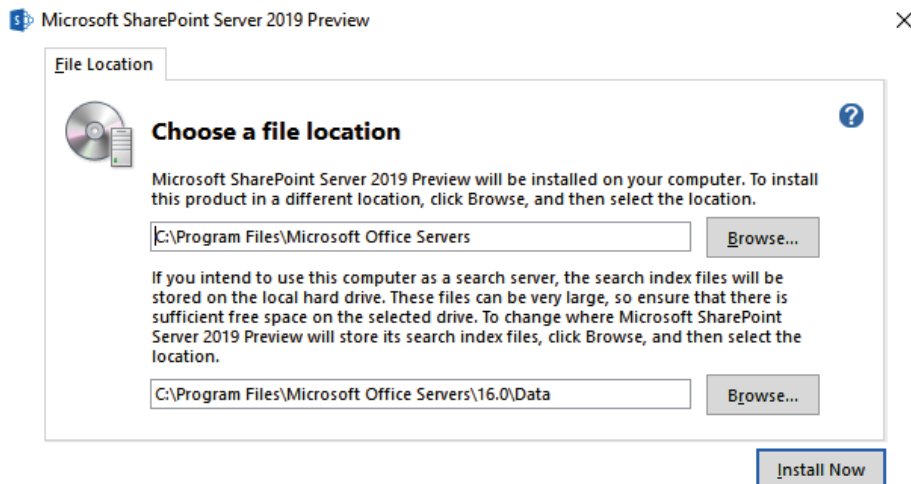


Figure 9.14 – Installation configuration screen for SharePoint

Notice that the second entry is for search index files. This is how we set our location for the search index and Temp space for the crawler. If you choose the default option, it will locate everything on the C drive. However, when you set up your search service, you can change the index location but not the Temp space for the crawler. To update the Temp space, we need to do the following using the registry:

```
HKLM:\Software\Microsoft\Office Server\16.0\Search\Global\
Gathering Manager
```

Update the registry with the new location for the Gathering Manager and reboot your machine. You will see that information will gather in the new path and that the OS drive will be free from clutter and growing index files.

CName versus A records

Scenario:

During the migration process, you've noticed that, when migrating an on-premises farm from one cloud service to another, some DNS records in the source farm for web applications and Host Named Site Collections are using CName records.

Behavior:

When you try to move a Host Named Site Collection, you notice that it's dependent on another site and is not an A record in DNS. This could be happening because the Host Named Site Collection (<https://xyz.example.com>) CName record is configured to relate to <https://xyzroot.example.com> in the source domain.

Fix:

All Host Named Site Collections in the new cloud service should be created with A records that have no association to the root-level web application. This breaks the dependency on the site having to have that site available to support the site being available on the new network. If that root site is not available, the site will not work using CName records in DNS.

Changing the names of databases

Scenario:

You didn't use a naming convention in your source farm and when migrating, you want to change the names of the content databases before adding them to the farm.

Behavior:

Naming conventions are good when you're using databases that support SharePoint. You see where someone could make a mistake by deleting a database by the way it was named. I have seen names such as `Temporary Database`, `Restore_12-11-2015`, which was a live database, `WSS_Content_Test`, which was a live database in production, and a host of other names that were deceiving when I read them.

Fix:

Before restoring any database, come up with a naming convention. When you have your naming convention, restore the database from a backup and in the properties, put in the correct name you would like for the database. Once you've restored the database, all MDF and LDF files will be named with the name you specified.

For MDF and LDF updates, if you are moving files from one server to another (which I do not like to do because if the file gets corrupted, you have nothing to fall back on), you would just rename both files with the name you want and attach them to the new server.

If the content database is already attached to the farm and you need to update the name, just disconnect it from the SharePoint farm (make sure you find out the location of the MDF and LDF before detaching them), detach the database from SQL Server, rename the MDF and LDF files, and then reattach the database to SQL Server. Once you've done that, you can right-click and rename the database to what you named the MDF and LDF files, unless you want someone to be confused.

HTTP authentication error when using a 2013 SPD workflow

Scenario:

A user's site has been migrated to the new farm and all checks have been made to ensure the site is working correctly. The site collection admin has republished all workflows as needed and has run checks to verify the workflows are working. A user goes to invoke a 2013 workflow on a document in a library and the workflow suspends.

Behavior:

When certain users try to use a 2013 workflow in a site, they get an error stating that there's been an HTTP authentication error.

Fix:

This error occurs due to the user who created the workflow not having a SharePoint user profile or the user who is invoking the workflow does not have a user profile. Please check that the user has a valid profile and, most importantly, that they have a work email address in the profile.

I've had several users who had profiles from the **Active Directory (AD)** domain and from a third-party cloud authentication solution in their user profiles. The problem was that none of the AD domain accounts had email addresses associated with the profiles, only the third-party solution. So, the user was creating workflows and using workflows that were created by the AD domain profile that had no email addresses. None of the workflows would work consistently. In the end, all the caches, including the SSL and SharePoint Designer caches, had to be deleted for this user to authenticate correctly.

This also presents an issue when users log in to their device using an AD account and when using a federated account to log in to SharePoint. Sometimes, the system gets confused. I have seen situations where a user has created workflows using their Active Directory account and have workflows with the federated account listed in the workflow view of SharePoint Designer.

Updating database permissions

Scenario:

After performing a content database migration, some SharePoint services fail on some sites.

Behavior:

Logins fail on certain content databases due to the service accounts' inability to access the content database.

Fix:

Make sure you go back and add the service accounts to the content databases that you added to a new farm due for migration purposes. You will see that when you update them to a web application, only the app pool account will be associated with the database.

To add the service application accounts, farm account, and any other account that would need access to the content database, there is some work that's required. Document the database's security before migration and duplicate it with the new service account names.

Also, remember to delete any other accounts that may have been used in the old farm that are not being used any more. We keep them in place while migrating but once the new security has been applied, we can remove those user accounts as part of the cleanup process.

SMTP mail issues

Scenario:

Users are complaining that mail from all alerts is working and that when they're sending emails within workflows, the emails never get delivered to the users.

Behavior:

The user sets an alert on a library or list and the alert is captured; then, a confirmation email is sent successfully. However, when they add anything to the library, no email is sent to let them know that content was added as part of the alert. This is the same behavior but with a workflow. When a workflow is processed on a document, no email is sent, as defined in the workflow, to the User.

Fix:

Verify that your port is open on the server, as well as your outgoing mail configuration in SharePoint. Then, verify that your outgoing mail works correctly using PowerShell:

```
$site = New-Object Microsoft.SharePoint.SpSite("https://  
sitename")  
  
$web = $site.OpenWeb()  
  
$mail = [Microsoft.Sharepoint.Utilities.  
SpUtility]::SendEmail($web,0,0,"lewin@xyz.com","Testing from  
PowerShell", "This is a test from PowerShell and server APP1")
```

In my case, the SMTP mail was working. All ports were working correctly, even with a custom port, 587. All was working well but no emails were getting to the users from any workflow, even though Alerts were working. I was scratching my head because I did not understand what was happening.

So, I started investigating further and noticed that there were some changes to the server. Upon accessing **Control Panel** and **Uninstall Software**, I noticed that three applications had been installed over the weekend. My users noticed the change in the delivery of mail over the weekend and Monday morning more so.

So, I screenshotted the applications that were installed and used Process Monitor to log processes on the Central Administration server, where outgoing mail is processed. In doing so, I noticed that one of the new applications was blocking all SMTP traffic. I uninstalled the application and voila – the SMTP mail started being delivered again. I also notified the security team to make them aware that this was the cause of my issue. Coordination between teams is very important so that everyone is aware of changes.

Site collection location

Scenario:

You are in the process of migrating content from one site to another farm. You need to understand what site collections are available in each content database so that you can come up with a plan to migrate those sites and let the users of the site know prior to the migration date.

Behavior:

Not all site collections are easy to find through the GUI of Central Administration. Yes, we can go there and find the site, which would give us the information we need, but in this case, we want to find out where the sites are so that we can plan, move sites around if needed, and know the sizes and other information about the site.

Fix:

Use PowerShell to find out information about on-site collections before migration. Have a list of sites, sizes, and content database locations so that you know how large the database is beforehand. This will help you plan and understand the time frames needed to move content from one farm to another farm or one server to another server.

Again, to move a site collection in order to groom the content database of unwanted or smaller site collections, use the `move-spsite` command:

```
Move-SPSite http://webapp/sites -DestinationDatabase  
NewContentDb
```

When you want to create a migration plan, we need to know more information. PowerShell comes in handy when you want to know how big the site collection is, as well as the content database's total size.

User migrations to a new domain

Scenario:

You are in the process of migrating and you notice some of the user accounts are failing to log in.

Behavior:

Users will fail to log in to the new site locations within the new farm because they do not have access to the sites.

Fix:

Use the PowerShell `Move-SP-User` command to move the account from one domain to the new domain. This will give the user rights to access the server. Most of the time, I have found that this is due to the account not migrating properly to the new domain.

```
$user = Get-SPUser -Identity "DOMAIN\JaneDoe" -Web https://  
webUrl  
  
Move-SPUser -Identity $user -NewAlias "Domain\JaneSmith"  
-IgnoreSid
```

That's it in terms of scenarios and fixes. Now, we will conclude this chapter.

Summary

Performance is one of the most important things you can implement as part of your SharePoint farm and environment. Without it, you will hear from your user community. I have done my best to provide as much information as possible within the confines of this book. Make sure to follow the guidelines we set here and always look at how you can tune your environment based on the ups and downs of concurrent users and services, which could peak at a certain time of the day.

Monitor your environment daily and understand how it is performing. You should also pay attention when tickets for issues come in. This can tell you a lot about your farm and when it has the worst performance. Home in on those time frames and see what is going on; for example, you could have peaked on CPU or memory. Investigating issues like these is crucial to getting in front of problems instead of waiting for them to happen.

Troubleshoot issues with the tools listed in this chapter and make sure to look at obvious locations first before gathering logs and searching through them. Following best practices during configuration saves you from having issues in the first place, so the more you do in the beginning, the less you have to fix in the backend.

If you have delivered the environment and are still having issues, this is the worst situation you can be in. Make sure to test and know your services work before you deliver them. Another thing to watch for is coming behind someone else's work. If someone else set up the farm, make sure to follow along or review all their configurations before delivering the farm. You can get yourself in trouble if you do not because if just one service doesn't work, everyone will be looking at you, not the technician that left after they did the installation.

In the next chapter, we will review reporting and the other features and integrations that are available to support it. We'll also talk about what cloud services are available for reporting via hybrid connectivity.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. When you're planning for performance, what are some areas you can key in on that support physical or virtual servers?
2. What can be a key issue when a user connects to the company VPN?
3. Developers can contribute to performance issues. What tool can they use to help mitigate issues with memory leaks?
4. What is the name of the tool that's used to onboard users using a recorded script and receive performance reports before we can go live?
5. Which SharePoint service supports OneNote client access?
6. When large files are kept outside of the content database, what caching solution should you use?
7. If my application pool is slow to respond every morning, how can I keep the application pool live?
8. What are some specific disk types we can use to support the physical performance of our physical server configuration?

10

SharePoint Advanced Reporting and Features

SharePoint 2019 has several advanced reporting features. These advanced reporting features include Excel Online, Power Apps, Power Automate, Power BI, SQL reporting services, and Visio and Visio services. In this chapter, we will explore some of these advanced reporting features in SharePoint 2019. Some of these features also exist in earlier versions of SharePoint, but you will see differences in how they are configured and integrated into SharePoint 2019.

SharePoint Server 2019 brings the cloud closer to customers and vice versa. The cloud features Power Apps, Power BI, and Power Automate, all of which are now available locally and bring the power of the cloud to on-premises farms. SharePoint Server 2019 includes process automation and forms technologies such as Power Apps and Power Automate to connect with your on-premises data. These features need to be configured via an On-Premises Gateway, which we will talk about in this chapter.

We will also briefly touch on various Azure tools and Excel Online, both of which have been built to integrate SharePoint. We will then reference a few third-party reporting applications that you may want to leverage in your SharePoint environment. This chapter is going to provide a brief overview of these reporting features, so do not expect a deep dive or an exhaustive exploration. If you want to do a deep dive into any of these topics, I have added some links to the *Further reading* section that you can explore further on your own.

The following topics will be covered in this chapter:

- Deprecated reporting features
- SQL reporting services
- On-Premises Gateway
- Power Tools
- Office Online Server
- Excel Online

Let's get started!

Technical requirements

To be able to understand this chapter and the knowledge provided, you will need to meet the following requirements:

- 3-5 years of experience using SharePoint
- 2 years of experience using Microsoft 365
- 2 years of experience using Azure

You can find the code files present in this chapter in this book's GitHub repository at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Advanced reporting and features

With more and more companies looking to move to the cloud in recent years, it seems that consolidation is a new priority. This is usually the largest area of need and has always been the architecture for supporting reporting and applications. The database resources that support those areas of our businesses are large and, if compromised, can put a company at risk. The security of our data is everything and we must keep that in mind as we clean up and figure out where our data should be located.

It is not uncommon for medium- to large-sized enterprises to have their data spread across multiple enterprise systems. These enterprises may have data residing in multiple locations, both on-premises and in the cloud. Data residing in disparate systems across enterprises that have not yet been consolidated can cause data compliance, performance, and redundancy issues. Not to mention, that keeping old database systems in play that are no longer supported by companies due to the company being no longer existent is a very high security risk.

As companies seek to trim their technical overhead by reducing the number of systems that maintain their data, this would be a prime target on the list for consolidation. Database architectures cost the most in any organization, be it cloud or on-premises. The licensing and overall cost for virtual or hardware can be staggering, depending on how much data and redundancy you build in the architectures.

The need for consolidation and integration becomes even more complex as companies merge and incorporate other entities under one umbrella. We are now seeing a trend where companies want to reduce the number of systems that they have and use one or two systems to view and manipulate data enterprise wide.

We are also seeing that user subscriptions are being more scrutinized now than ever because of companies spreading their applications, business processes, and storage over many cloud providers. I have had one customer paying \$100 a month per user and they had over 10,000 users. Upon breaking down the subscriptions, they were paying \$35 for Microsoft 365 and \$65 for a subscription to an enterprise cloud application that was used by everyone. The application could have been built in 365 using the tools available, which could have saved them lots of money.

So, in most cases, these subscriptions and applications being used in the cloud need to be looked at thoroughly. It is not cost-effective and you can run the risk of putting too much at stake by connecting many cloud architectures together. With the cloud being so new, things are changing daily. Your IT staff must understand the risks of securing those risky areas. Since this can be a huge task, especially managing all these clouds and on-premise areas, advanced reporting will be the biggest area of concern due to the size and sensitive nature of the data being exposed.

However, as we mentioned previously, there is the need to have our teams work smarter and put the power in the hands of the users to a certain point. We must empower them to create their own applications and their own reports, which trims the need for development staff and the server footprint to support the database architecture. Doing this helps put data into perspective. If you have a small database, change where you hold the information. Put it into SharePoint, where it can be utilized by everyone. Access databases are a perfect target for migrating to SharePoint, and you can also redo the process using Power Tools.

Advanced reporting has always been a key integrated feature in SharePoint and is now even more powerful. People really use SharePoint effectively when collaborating. Collaboration means we are working together as a team to manage projects, tasks, data, and documents. If we are working as a team, reporting should be easy, right? This is because if we are using a collaborative platform with abilities to connect to other data platforms, then all data can be reached. This is exactly why SharePoint was created.

There are other features, such as Power Automate and Power BI, that also give you easy ways to pull data and report on it – either from databases, Excel spreadsheets, or SharePoint lists – using these new cloud features. Workflow processes can also be built with these tools, which automates processes and captures information based on the process at hand.

Since SharePoint 2019 is built on the same version of SharePoint as SharePoint Online, you will see that using modern sites is available in this 2019 version of SharePoint, which makes it somewhat comparable to Microsoft 365. Microsoft 365 has more features on the backend and is a lot more advanced, but you can accomplish some of the same things in the on-premises version of SharePoint 2019.

The power of this platform is that you can put certain tools in the hands of users who need reports and processes that they can create on their own. Using the tool sets described in this chapter will help users make applications that can be shared across the enterprise. Users can also take advantage of using out of the box views in SharePoint lists. This has been a traditional way of reporting information in lists and libraries. We should not forget that we have the out of the box capabilities and customized capabilities of JSON, which we can use to format views from lists. Remember that although there are many new solutions that can help show and process this data in many different ways, we still can use some of our old customizations to do our work as well.

In this chapter, we will show you how to gather data and how the tools that make applications, business processes, and reports based on specific areas of content are not as hard to use as you may think. Using tools such as SSRS, Power BI, Power Apps, Power Automate, and Excel Services, you can create forms, workflows, and pull reports together quickly.

Deprecated features

With SharePoint changing over the years, we have seen many features come and go that were used in prior versions of the software. We saw a big change from 2010 to 2013, with one of them being the focus on claims authentication. Classic Windows authentication was still available, but this created some extra steps when migrating from that version of SharePoint. It was a real eye opener and let us know to expect change.

The most memorable for me was the FAB 40 templates and the Productivity Hub, which for some people still using SharePoint 2007 and 2010 need to be aware of. These templates will not work in 2013 or later versions of SharePoint. This was a big surprise for a lot of people because Microsoft created them. Everyone was expecting them to be available in the next versions to come but to our surprise, they did not make it.

With SharePoint 2016, we also saw a big shift, with Excel Services being moved from a service in SharePoint to a service within Office Online Server now known as Excel Online. This change makes sense to me because these services do need their own server resources to keep SharePoint running at peak performance. There are already enough services and web applications that SharePoint server farm resources provide, so taking some services and spreading them out over resources is great news, but it will cost you to add another server. However, if this new server is a VM, this will not be that costly.

The following is a list of deprecated and removed reporting features for SharePoint 2019:

Feature	Status
SQL Server Reporting Services Integrated Mode	Removed
Power View	Removed
BISM file connections	Removed
InfoPath Services	Deprecated
PerformancePoint	Deprecated
Power Pivot for SharePoint	Removed
Scheduled workbook data refresh	Removed
Workbook as a data source	Removed
PowerPivot management dashboard	Removed
PowerPivot Gallery	Removed

Figure 10.1 – Deprecated and removed reporting features

So, it never phases me to see that we have many business intelligence features that have been removed and deprecated from within SharePoint natively with replacement applications. These features, which have been renamed and refined, are now integrated with SharePoint but are not native to it. I am sure we will see more of this to come in newer versions of SharePoint and within Microsoft 365.

Some of the removed and deprecated features include PerformancePoint, which is now deprecated in SharePoint 2019. Performance Point services, which included the ability to create scorecards and analytics reports, has also been removed from SharePoint 2019. Most of the functionality of PerformancePoint is available in Power BI and Power BI Report Server, which we will discuss later in this chapter.

PowerPivot for SharePoint has also been removed, which included the Power Pivot management dashboard known as PowerPivot Gallery. This was a huge integrated service that I only saw installed correctly without broken configurations in only a couple farms.

It was a very useful integration and provided users with another way to provide reporting on data. Most users loved this feature because it was built into the desktop version of Excel already. Now, users will need to take advantage of Power BI and Power BI Report Server to get some of the same functionality.

PowerView and BISM file connections have been removed completely from SharePoint. This type of connection is typically used by Excel and SSRS to connect PowerView reports to SQL server analysis services data sources. However, this is no longer included due to PowerView being removed.

We will not go over InfoPath in this book, but we will mention what has taken place as part of the big move to the cloud. InfoPath has been deprecated as well but still works as it did in other versions of SharePoint. It currently works in SharePoint Online. It is still available by default in the installation for SharePoint 2019 and is managed the same as it was in prior versions. You will still need to use InfoPath Designer 2013 to create and publish those forms to SharePoint 2019.

If I were you, I would start moving away from this product as soon as possible. This is because many companies have used this product over the years and have many forms published using InfoPath, along with workflows for creating business processes. I have seen this with my own eyes and one of my latest customers had so many InfoPath forms it would take them years to recreate them.

The problem comes with Microsoft pulling the plug on old applications, as they did with SharePoint Designer 2010 workflows. This means they may pull the plug on InfoPath in the next couple years. Is that enough time for you to recreate all the forms you have in your current farm? Probably not. As I explained previously, there is a learning curve with Power Apps and Power Automate, so you really need to start migrating and planning now.

You may be wondering why this is the case. Well, things change all the time. Your company may change direction and not want to use SharePoint 2019 and go straight to SharePoint Online. In 2021, you will be better off using cloud applications to create your forms and workflows. This will be very helpful when you migrate to the cloud as the core components will be in place, and training for those new tools can be achieved earlier. It is always good to think ahead.

SQL Reporting Services Integrated Mode has also been removed from SharePoint 2019 released version. SSRS Integrated Mode was deprecated in 2016, but it could still be used with SharePoint 2016. With SQL Server 2017, it was completely removed and is not supported in SharePoint 2019.

Next, we will discuss what BI tools work in SharePoint 2019. This will give you the guidance to move forward with integrating BI into your new SharePoint 2019 environment.

Azure Active Directory

Azure Active Directory is Microsoft's identity and access management solution and is required for cloud security and managing user accounts. Your company's Active Directory and human resources rolls can be added to a secure version of Azure Active Directory. This Active Directory access management tool will manage your access to the Microsoft 365 app suite. This is great for hybrid configurations because although your SharePoint 2019 environment is on-premises, you can still leverage the newly updated reporting services and applications that are available in the cloud.

Important Note

The following link provides an overview of Azure Active Directory:
<https://docs.microsoft.com/en-us/azure/architecture/reference-architectures/identity/azure-ad>.

Most organizations maintain a mixture of on-premises and cloud applications. Azure Active Directory offers a solution for managing access and identity for both. This is more important now than ever because the on-premises deployment of SharePoint 2019, as discussed previously, is unable to use many of the previous on-premises reporting solutions. This fact drives the need for hybrid solutions so that admins and the user base can utilize the features of Microsoft's cloud applications, such as Power Automate and Power BI.

Azure Active Directory uses a **tenant architecture**. Within the Azure Active Directory ecosystem, you must create a tenant. Each tenant is its own instance partitioned within Azure AD. Each tenant represents an organization of users that will access applications. When the Azure AD Tenant is set up, the administrator can choose the source of user accounts. In most instances, the on-premises source within the organization would be Windows Server AD. Azure has a tool called **Azure AD connect** that you can use to synchronize your Azure Tenant with your on-premises Active Directory.

Formally, Azure AD was solely a managed service but due to high demand, Azure recently added Azure ADDS trust. This is important for many organizations and enterprises that want to keep all their identity management on-premises, but also wish to allow Azure AD to utilize those identities to connect to the cloud-based apps that Microsoft 365 provides. I will not go too deep into the one-way outbound forest trust as it is beyond the scope of this book. However, do explore this option, especially if your organization is hesitant to adopt Azure AD. Azure ADDS's one-way trust relationship will allow users and applications to authenticate against the on-premises Active Directory domain environment from the Azure ADDS managed services domain. This may be key to incentivizing hesitant management to begin adopting cloud technologies for use within their on-premises environments.

SQL Reporting Services

SQL Reporting Services is a powerful tool for gathering reports within SharePoint. The service can gather and display reports in many ways and from many data resources. However, when used in SharePoint, you can only pull from SharePoint lists. You cannot combine reporting from SharePoint lists and a database resource at the same time unless you customize the data within the SharePoint list so that it includes an offsite database that uses BCS.

In previous versions of SharePoint, an admin could install **SSRS (SSRS)** in SharePoint integration mode versus Native Mode. SSRS Native mode is when the reporting services are installed to run on a separate application server and the reporting services are supplied to SharePoint through the Report Viewer web part.

In this configuration, all the processes run on the application server. With Integrated Mode configured, these services can be installed on a SharePoint server running internally on the SharePoint farm. Integrated mode installations caused a few issues because if a customer only wanted the BI solution, they would be forced to install SharePoint to get access to reporting features such as PowerView.

The integrated mode for SSRS and SharePoint also left some of the Native Mode features out, such as Linked Reports, My Reports, and subscription and batching. The move away from SSRS integrated mode is in line with Microsoft moving away from heavy on-premises installations to a preference for cloud integration and putting more feature capabilities, such as reporting services, in the hands of the end user.

With SharePoint integrated mode, SSRS was installed on a SharePoint Server. It still requires a SQL Server license. You could use SQL Server 2012 Standard Edition to access many of the reporting features unless you had a need for PowerView, in which case you would have needed to install SQL Server Enterprise Edition. However, now, SQL Server Standard Edition is not available for SharePoint 2019 and it must be installed to leverage SSRS. This is more costly than the standard edition, so keep that in mind when you are planning your deployment architecture and costs.

Also, since SSRS cannot be deployed on a SharePoint Server in SharePoint 2019, this must be another server that must be monitored and maintained. This can add to the admin troubleshooting burden as you will now have to troubleshoot reporting issues from SQL server instead of directly from your SharePoint Server.

The reporting capability now resides outside of SharePoint and is solely native to SSRS so that it can be leveraged by SharePoint. Since **Native** mode is the only way to leverage SSRS in SharePoint 2019, SharePoint connects to this external application server through the SQL Reporting Services Report Viewer Web Part.

The Report Viewer web part enables you to put embedded paginated reports that are stored in SSRS (Native mode) into a page on your SharePoint site or Power BI Report Server into SharePoint Server web part pages. However, you cannot use this web part for Power BI reports. The web part can only be used with classic pages in SharePoint. Modern pages are not supported.

To utilize the Report Viewer web part in your SharePoint farm, you need to download the report for your web part. Then, you need to deploy the web part to your SharePoint farm in order to run the SharePoint management shell from your SharePoint farm. Remember to run the SharePoint management shell as administrator. For this, you can run `Add-SPSolution` to install the `ReportViewerWebpart.wsp` package.

You can download this package from <https://www.microsoft.com/en-us/download/details.aspx?id=55949&751be11f-ed8-5a0c-058c-2ee190a24fa6=True>.

To deploy the package, follow these steps:

1. Open SharePoint Management Shell on SharePoint 2019 Server and choose **Run as Administrator**.
2. Run the `Add-SPSolution` command. This adds the farm solution to the farm. The following is an example of this:

```
Add-SPSolution -LiteralPath "Drive:\*solutionfolder*\
ReportViewerWebPart.wsp"
```

3. Run the `Install-SPSolution` command to deploy the farm solution to the farm. The following is an example of this:

```
Install-SPSolution -Identity ReportViewerWebPart.wsp  
-GACDeployment -AllWebApplications
```

Note

You can deploy solutions to a specific web application if required by using the `-WebApplication` parameter.

You need to activate this feature from the site collection where you want to view Power BI paginated reports. To do so, follow these steps:

1. Navigate to the site collection.
2. Click the gear icon and select **Site Settings**.
3. Under **Site Collection administration**, click **Site Collection Features**.
4. Scroll down the page until you get to **Report Viewer WebPart**. Click **Activate**.
5. This feature will now be available on your site collection.

Migrating integrated reports from previous versions is supported through the use of a script that Microsoft provides for moving these documents. Microsoft has stated that it will continue to support SharePoint integrated mode in earlier versions of SharePoint. However, if you have SSRS reports from previous versions of SharePoint and you want to migrate them to SharePoint 2019, you will need to leverage the migration script that will change the reports from integrated mode to **Native** mode.

To use the script, follow these steps:

1. Download the `ssrs_migration.rss` script.
2. Download the Reporting Services `RS.exe` migration script from this book's GitHub repository to a local folder.

Note that you will lose your passwords once you migrate your reports. These passwords must be reentered. Make sure you document those passwords if you have not already. Data sources can be located on various SQL servers in our enterprise. Just make sure you have covered all your bases as they contain stored credentials.

Note

For more information, see the section How to use the script section of this article: <https://github.com/Microsoft/sql-server-samples/tree/master/samples/features/reporting-services/ssrs-migration-rss>.

Now that we have installed the solution into the farm, let's configure the sites where we want to use the web part by adding it to the pages within the site.

Site feature configuration

Adding the web part to a page is straightforward and remains the same as it was in older versions of SharePoint. To start this process, follow these steps:

1. In your SharePoint site, select the gear icon in the top-left corner and select **Add a page**:

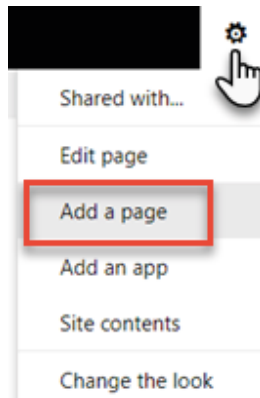


Figure 10.2 – Add a page

2. Give your page a name and select **Create**.

3. Within the page designer, select the **Insert** tab from the ribbon. Then, select **Web Part** within the **Parts** section:

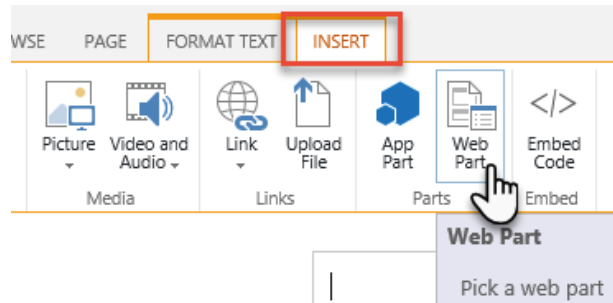


Figure 10.3 – Choosing Web Part from the ribbon

4. Under **Categories**, select **SSRS (Native mode)**. Then, under **Parts**, select **Report Viewer** and select **Add**:

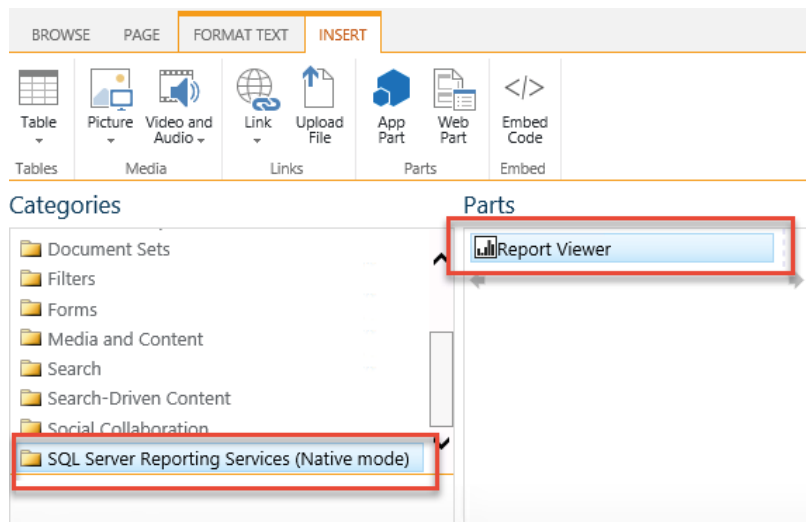


Figure 10.4 – Choosing Report Viewer from the menu

You may see an error initially. This is because the default report server URL is set to `https://localhost` and may not be available at that location.

Configuring the Report Viewer web part

To configure the web part so that it points to your specific report, follow these steps:

1. When editing the SharePoint page, select the down arrow in the top-right of the web part and select **Edit Web Part**:

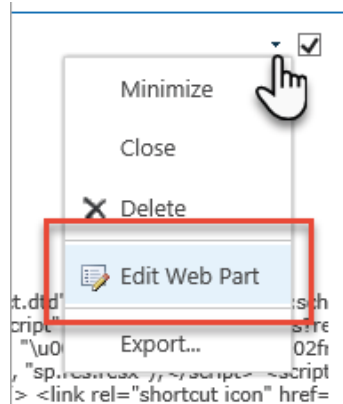


Figure 10.5 – Edit Web Part

2. Enter your **Report Server URL** for the report server hosting your report. The URL should look similar to `https://myrsserver/reportserver`.
3. Enter the path and name of the report you want to display within the web part. It will look similar to `/AdventureWorks Sample Reports/Company Sales`. In this example, the Company Sales report is in a folder called AdventureWorks Sample Reports.
4. If your report requires parameters, once you have supplied the report server URL and the name of the report, select **Load Parameters** within the **Parameters** section.
5. Select **OK** to save your changes for our **Web Part**.
6. Select **Save** from within the Office ribbon to save these changes to the SharePoint page.

As you can see, Microsoft thought about those customers who use a lot of reporting features. At one point, I did not think they were going to give us any tools for SSRS so that we could migrate to the cloud. I thought there would have been a conversion or something using a new tool they created. This really confirmed that Microsoft takes everything into consideration and gives us options to move forward.

Using Report Builder

What is Report Builder? **Report Builder** is a tool that allows users to create SSRS reports. This tool is native to SSRS and was integrated with SharePoint 2013 and SharePoint 2016. However, with integrated mode being removed in SharePoint 2019, Report Builder can only be used once your SharePoint site has been configured to work with SSRS and Report Builder has been configured.

Using Report Builder, you can determine what data sources you will pull into your report, the datasets you want to utilize, and how you want that data displayed. Report Builder allows you to create reports using existing datasets and **report parts**, which are parts of already created reports that you have access to pull into your new report. It has a great drag and drop feature that allows you to customize your report fields and layouts.

Note

You can download Report Builder by going to <https://www.microsoft.com/en-us/download/details.aspx?id=53613>.

You can install Report Builder by going to <https://docs.microsoft.com/en-us/sql/reporting-services/install-windows/install-report-builder?view=sql-server-ver15>.

To create a simple report in SharePoint using Report Builder, you must have your SSRS configured and have Report Builder installed. You are on your way to building a report using this tool. It is a good idea you try and utilize the tools that you will be rolling out to your users and document any issues. Ensure you cover them while training. We will discuss this later. The following steps show you how to build a very simple report:

1. Open Report Builder and choose a dataset screen. The default choice will be to create a dataset.
2. Click **Next**.
3. On the **Data source property** screen, click the **Build** button.
4. Next, you will need to enter the **SQL Server** name that you want to connect to.
5. Enter the database name under **Select** and select the name of your database.
6. Click **OK**.
7. In the **Data source property** window, click **Credentials** and enter your **Username** and **Password**.
8. You will see **Use as Windows credentials**. Check this box and click **OK**.
9. Select the following from the list and click **Next**:
 - a) **NameCustomer**
 - b) **Namelocation**
 - c) **Factloanamount**
10. From the fields listed, click **Factloanamount** under **Values**.

11. From the available fields, drag the United States location under the road and click **Next**.
12. Choose the layout you want and click **Next**. Alternatively, you can choose the style you want and click **Next**.

There are some cosmetic changes that you can make to update reports so that they are more attractive and easy to read. Using Report Builder, you can add titles to your report and resize your columns and rows. However, this is beyond the scope of this simple tutorial. More advanced tutorials are available on Microsoft's website: <https://docs.microsoft.com/en-us/sql/reporting-services/report-builder-tutorials?view=sql-server-ver15>. There are even third-party classes available that provide support.

As we can see, we have not really lost a lot of functionality with SSRS, but things have changed. We can migrate reports and even show those reports in our sites using web parts. The interfaces have stayed somewhat the same, but the locations of tools and administration has changed, which has added a new twist to maintaining the farm and what you need to be aware of in SQL Server.

Hybrid configurations

Since SharePoint 2013, we have seen how we can interface our on-premises SharePoint farms with the Microsoft 365 platform. There is no reason not to have a mixture of both cloud and on-premises functionality nowadays. To be quite honest, my recommendation is to stay in this configuration. This gives you control over your data and any content that you may not want to have hosted on systems in the cloud. These configurations also give you bridges to move to the cloud as fast as you like instead of all at once. Also, allowing you to use tools and services in the cloud can be very useful in helping you further collaborate and bring about a broader range of reports, data gathering, and automation.

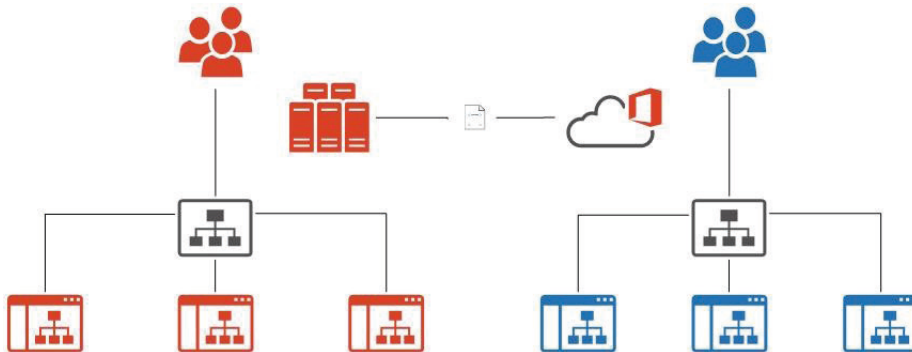


Figure 10.6: Hybrid Configuration

We are going to touch on those areas in this chapter so that you know what is offered mainly on-premises, but we must remember that these services play both ways. So, what I can connect to in the cloud I can also connect back to my on-premises environment. There are endless possibilities that can help you manage the cost of your services and analyze the needs of moving to the cloud instead of moving blindly.

SharePoint hybrid gateways

When deploying SharePoint on-premises, there is a functionality that is needed to create this hybrid connection to the cloud. You can create that connectivity using the Hybrid Picker which is a SharePoint Hybrid Configuration Wizard that you can download from your Microsoft 365 tenant. The trusted communication that must be created can be created from your on-premises enterprise internal SharePoint Server, either in a private cloud that hosts servers or in a public cloud that hosts servers for SharePoint 2019. This goes without the need to use the cloud, so this could be Azure, AWS, or RackSpace. Wherever you are and depending on your network configurations, which may take some toying with, this connection can be made so that you can reap the benefits of this hybrid gateway.

Link to Hybrid Picker Overview: <https://docs.microsoft.com/en-us/sharepoint/hybrid/hybrid-picker-in-the-sharepoint-online-admin-center>

I highly recommend using the hybrid connectivity provided by the cloud. I really believe that companies should take full advantage of this functionality to move forward in using the cloud for other solutions. This allows you to have the cloud meet your internal server resources and manage those functional areas, which can bring a host of new possibilities.

You have complete control of your on-premises environment, which also means that you have complete authority over it. There is no need to be limited to this environment – just the software boundaries that come with the product. Other than that, follow best practices and provide any customizations you want to deploy in this environment. You get some of the features of the cloud but since they are two different environments, there will be some limitations.

The following are the areas where you will see available features when creating this connection:

- **Hybrid Sites:** Allows users to follow sites on-premises and in the cloud.
- **Hybrid One Drive for Business:** Creates a user's OneDrive for Business profile in the cloud instead of on-premises.
- **Hybrid Self-Site Creation:** Redirects sites to be created in SharePoint Online only.

- **Hybrid Auditing:** All audit logging is pushed from on-premises to the cloud.
- **Hybrid Taxonomy and Content Types:** Allows shared taxonomy and content types between the cloud and on-premises environments.
- **Hybrid Business Connectivity Services:** Allows data to be securely displayed from external systems within the cloud or on-premises.
- **Hybrid Search:** Allows you to search both on-premises and the cloud for function separating indexes that are supported on those systems individually.

When taking advantage of this configuration, we must plan what we expect to gain from this hybrid connectivity. Some questions you need to ask before you go down the road of configuring this connectivity are as follows:

- What are the business's goals for the future?
- What benefits can we, as a company, get from these features?
- Do we even plan to go to the cloud?
- Are our users trained enough to realize the benefits of these features?
- How will we manage this from a topology standpoint?
- Will we be able to support these areas within SharePoint 2019 effectively?
- Will security be an issue if we implement this feature?
- How does governance play a role in this new connectivity at this point?
- Do we need to update our Governance Plan?

These are just some of the questions that need to be answered at this point. You want to make sure you have a plan in place and that that plan is followed so it is documented. Your risks at this point could be the answers to one of these questions. Please understand what you are creating, providing, and managing at this point – a connection to the cloud that you want to be able to leverage. Before including this as a solution for your company, make sure you understand what it brings to the table.

Although there is not a lot of space in this book to write about this subject, I do want to touch on some of the topologies that can be configured when using this Hybrid Gateway for SharePoint 2019:

- **One-Way Outbound Topology:** On-premises to the cloud
- **One-Way Inbound Topology:** The cloud to on-premises
- **Two-Way (Bidirectional) Topology:** Communicate back and forth between the cloud and on-premises environments

To create the connection, we need to know the requirements for these features to exist:

- An on-premises Active Directory Services domain.
- An operational SharePoint Server Farm.
- Have a configured Microsoft 365 organization with E1, E3, or E4 licenses.
- STS certificate in the SharePoint farm that is used by the hybrid picker to establish token signing trust when configuring hybrid workloads.

To set up the Hybrid Picker on your SharePoint Server, you need to meet some other requirements, as follows:

1. Sign up and register your domain with Microsoft 365.
2. Synchronize your user account with Microsoft 365.
3. Assign the respective licenses to users.
4. Create services for User Profile, Managed Metadata, and Application Management Service.
5. Create a web application for My Sites with the My Site Host site collection template.

To find out more about this process, please go to <https://docs.microsoft.com/en-us/sharepoint/hybrid/set-up-sharepoint-services-for-hybrid-environments>.

All inbound connectivity for search, business connectivity services, and Duet Enterprise Online may require further configuration using reverse proxy devices, and internet domain with permissions to create and edit DNS records, and using a wildcard certificate for encryption between Microsoft 365 and the proxy device. On-premises SharePoint SSL certificates also need to be configured on the on-premises SharePoint web application.

The reverse proxy devices that are supported for this are as follows:

- Windows Server 2012 R2 with **Web Application Proxy (WAP)**
- Forefront **Threat Management Gateway (TMG)** 2010
- F5 Big-IP

Note

More information about the configuration you need to do can be found here: <https://docs.microsoft.com/en-us/sharepoint/hybrid/configure-server-to-server-authentication>.

As you can see, there are many configuration steps and areas you need to tend to when creating this connection between your on-premises and Microsoft 365 environment. To install the Hybrid Picker, execute the following steps:

1. Log into the console of a SharePoint Server farm server as a farm admin.
2. From the farm server, connect to Microsoft 365 as a global admin.
3. Navigate to <https://go.microsoft.com/fwlink/?linkid=867176>.
4. To configure your hybrid features, follow the prompts provided by the Hybrid Picker.

There is a lot more to this configuration. You can find out more by taking a look at the links provided in the *Further reading* section. In this chapter, I did not want to focus much on the configuration but expand on the capabilities and applications in the cloud that can bring benefits to your on-premises environment. Unfortunately, I do not have the room in this book to publish the whole configuration.

The configurations for hybrid can be removed if needed but from my experience, this is not easy to do. You may find some residue from these configurations, which is why you should think through this process before moving forward. This can be a great experience, but you really have to plan and make sure your architecture is correct before following through with it.

On-premises data gateways

Opening an on-premises gateway provides secure data transfer between on-premises content and server Microsoft cloud services. This gateway is a bridge that provides cloud services to internal enterprise servers. The applications that can be used with this gateway are as follows:

- Power BI
- Power Apps
- Power Automate
- Azure Analysis Services
- Azure Logic Apps

When utilizing this method of connecting on-premises enterprise systems and cloud services, organizations can keep their databases and other data sources on their enterprise networks. This process was built to be secure so that customers can take advantage of the features that are only available in the cloud.

There are two types of gateways available:

- **On-premises data gateway for multiple users:** This allows multiple people to connect to on-premises data sources. It opens a single gateway for this purpose and can support complex scenarios with multiple people accessing multiple data sources.
- **On-premises data gateway for a single user:** This is a personal mode that allows one user to connect to sources that cannot be shared with anyone else. The Power BI cloud service can only be used with this offering. If your company only has one person creating reports, this would be the gateway you'd use with your company's needs.

There are four main steps to installing the gateway:

1. Download and install the gateway on a local server.
2. Configure the gateway using firewall and other network requirements.
3. Add users as gateway admins to administer the gateway.
4. Troubleshoot any issues you may have when setting up the gateway.

Installing the gateway is fairly easy unless you run into issues. There is a troubleshooting page that can help you if you have problems getting this setup on your server: <https://docs.microsoft.com/en-us/data-integration/gateway/service-gateway-tshoot>.

The requirements for installation are as follows:

- **Minimum requirements:**
 - .NET Framework 4.6 (Gateway release August 2019 and earlier)
 - .NET Framework 4.7.2 (Gateway release September 2019 and later)
 - A 64-bit version of Windows 8 or a 64-bit version of Windows Server 2012 R2
- **Recommended hardware:**
 - An 8-core CPU server or workstation
 - 8 GB of memory minimum
 - A 64-bit version of Windows Server 2012 R2 or later
 - Solid-state drive storage for spooling

Next, we will look at the best practices for configuring an on-premises gateway.

On-premises gateway configuration best practices

When setting up any IT configurations, you always want to check the best practices for the system you are building. Please review the following best practices when using an on-premises gateway:

- Gateways, as you may have guessed, are not supported on Server Core installations.
- The user installing the gateway must be the admin of the gateway, so using a personal account may not be the best idea. You don't want to tie up the services with an account that could be disabled one day.
- As you know, we do not want to install anything on a domain controller that has connectivity to something outside the organization.
- Remember that if you are planning to use Windows authentication, you must install the gateway on a server that is connected to the domain.
- Do not install the gateway on a computer that may get turned off, such as a personal computer.
- You may want to shy away from installing other applications on this server as those services could stop the gateway or create a slow response.
- Installing one personal mode and one multi-user mode gateway is supported on the same server.

To install the gateway, download the installation files from Microsoft by going to <https://go.microsoft.com/fwlink/?LinkId=2116849&clcid=0x409>.

You can configure an on-premises gateway by following these steps:

1. Provide a location for the installation files and accept the terms of use:

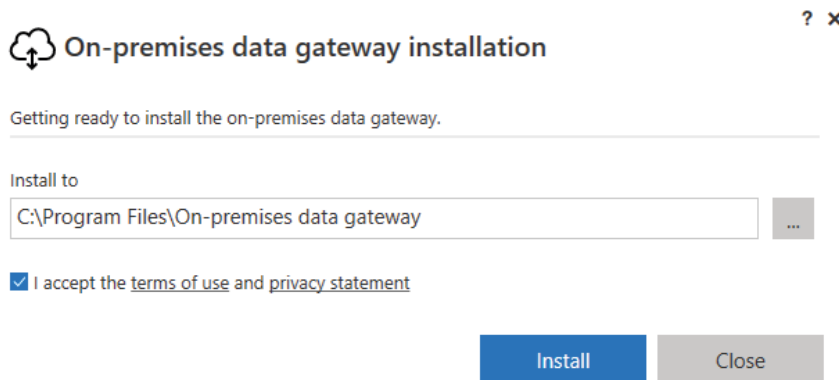


Figure 10.7 – Configuration screen

2. Once the installation is successful, enter an email address to use this gateway. The email address needs to a work or school account that's used to sign into Microsoft 365. This should be your organization's account.
3. You will now be fully signed into your gateway on this computer.
4. Now, you have the option to migrate or register the gateway. As part of the migration process, you can migrate the gateway for one of the following reasons:
 - Move to a new computer
 - Recover a damaged gateway
 - Take ownership of a gateway
5. Insert a name for the gateway and create a recovery key for it. Once completed, click **Configure**.
6. Now that the gateway has been created, click **Close** to exit the setup.

Once you have finished with the setup, you have the option to restart the gateway, give the gateway a service account, perform diagnostics and network setting configurations, and more. You can play around with these once you have this set up in your environment. At the moment, we can use the gateway to create connections to data in our on-premises environment.

Now, let's talk about the tools we will be using to connect to our data sources within the enterprise, starting with Power BI.

Power BI

Power BI is a cloud platform that gives everyday users a way to connect to and visualize many data sources in your enterprise. The interface will be familiar to those users who have worked with Excel and it has deep integration with other Microsoft products. This gives our users the ability to build robust reports using a self-service application that gives them the tools to analyze and aggregate data. The platform is easy to use and can help a company gain better knowledge of the data they are managing using this self-service tool.

Power BI can help a company make decisions based on data since the product allows you to connect to multiple data sources and aggregate data. So, depending on the data and reports generated, this can prevent the company from making bad decisions. With Power BI, you will see that the data is made available through charts, graphs, and other visual ways by modeling data how you want to see it. You can build KPIs and other advanced reports using this tool. The data can also be exported as other formats, such as PDF, Excel, and PowerPoint.

The advantages of Power BI are that you can connect to many data sources individually or multiple data sources to create more advanced reports. There are over 120+ free data connectors that support many other database platforms. With these connectors, you can take advantage of the big data investments your company has put a lot of time and money into to provide insights across your organization. By using Power BI, you can start working smarter. The tool allows you to analyze data and share it while maintaining the consistency and security of your data. Your data is protected even if you share information outside your organization.

Power BI was built to put the manipulation of data in the end users' hands. In the past, users had to rely on the IT department to build reports from the data that resided in database systems. As we have seen, in recent years, Microsoft has decided to put more functionality into the end user's hands so that they do not have to rely on a database programmer, or other development teams, to give them reports. This can be seen in several aspects of Microsoft's strategy, including self-service site creation.

SharePoint is one of the systems that leverages Power BI to accommodate data flowing from various sources. When you are implementing SharePoint within an organization, it is important that you understand not only your current challenges but also your future goals, as well as the vision and direction of the company when it comes to data management.

Next, we will briefly look at Power BI and the tools available for managing and manipulating data.

Power BI admin

This tool allows you to manage organization-wide tools that control how Power BI works. The portal provides settings that allow you to manage and monitor the usage as well as manage tenant settings. Users that have been assigned admin rights can configure, monitor, and provision organizational resources. Power BI admins should be familiar with other related tools and admin centers within Azure and Microsoft 365.

There are a few admin roles to consider when using Power BI. These roles are used to spread security roles across the admin center:

Type of administrator	Administrative scope	Power BI tasks
Global admin	Microsoft 365	Has unlimited access to all management features for the organization
		Assigns roles to other users
Billing admin	Microsoft 365	Manage subscriptions
		Purchase licenses
License admin	Microsoft 365	Assign or remove licenses for users
User admin	Microsoft 365	Create and manage users and groups
		Reset user passwords
Power BI admin	Power BI service	Full access to Power BI management tasks
		Enable and disable Power BI features
		Report on usage and performance
		Review and manage auditing
Power BI Premium Capacity admin	A single Premium capacity	Assign workspaces to the capacity
		Manage user permission to the capacity
		Manage workloads to configure memory usage
		Restart the capacity
Power BI Embedded Capacity admin	A single Embedded capacity	Assign workspaces to the capacity
		Manage user permission to the capacity
		Manage workloads to configure memory usage
		Restart the capacity

Figure 10.8 – Security roles in Microsoft 365

To get to the admin portal, you must have provisioned the Power BI service administrator role or a Global Admin role. These roles can be provided via the web interface or PowerShell. The limitations of this role are as follows:

- The ability to modify users and licenses within the Microsoft 365 Admin Center
- Access to all the audit logs

Using the Power BI Admin Role, you can only see a limited amount of information in the user audit logs. The log only keep activity data that has been collected over a 30-day window. Currently, there is no user interface for searching the activity log currently. Admins can download activity logs using the Power BI REST API and management cmdlets.

Power BI Desktop

There is also a free application called Power BI Desktop. This application runs on Windows 10 and on mobile. It is available for Windows, Android, and iOS devices. There is also a Power BI Report Server that can be used on-premises to support companies that want to maintain their data and reports. This version of the software is called Power BI Desktop for Power BI Report Server.

There are several components that help users get the most out of the platform:

- **Power Query:** A data mashup and transformation tool
- **Power Pivot:** A memory tabular data modeling tool
- **Power View:** A data visualization tool
- **Power Map:** A 3D geospatial data visualization tool
- **Power Q&A:** A natural language question and answering engine

As stated previously, there are over 120+ connectors available, which gives you the ability to connect to most types of databases and data sources. You can also connect to a SharePoint list, a SharePoint Excel file, and a SharePoint folder. From there, you can view the data contained within that list or folder.

To create a Power BI report, you must download the Power BI Desktop application. Once you open the application, you have the option to select **Get Data** and choose your resource. You then need to query the data to create reports based on the needs within the data provided.

Once you have created your report, you can share this report in a secured manner to users both internally and externally. Mobile and cloud users can also see the reports you've created, and the users can interact with the report using these platforms. Security can be set as well since you can give users the ability to read or edit reports based on groups or individual use.

There are three levels of usage that Power BI provides (note that these pricing tiers may change):

- **Power BI Desktop:** Free
- **Power BI Professional:** \$9.99 a month
- **Power BI Premium:** Cost determined based on the size of the deployment and the amount of users

There is also a web part that is available within the SharePoint Online Microsoft 365 offering. Unfortunately, the dynamic Power BI web part is only available for SharePoint online and cannot be used with SharePoint 2019 On-Premises. With the Report Viewer web part, you can view paginated reports that are available on the Power BI report server directly in SharePoint.

Since this book is primarily about on-premises resources, I wanted to touch a little more on Power BI Desktop for Power BI Report Server.

Best practices for Power BI

When creating charts and reports using Power BI for your SharePoint sites, there are a few best practices that you must keep in mind. You must be aware of the number of charts and visuals that you embed into your SharePoint site as they can greatly impact performance if you have too many. This is especially important if you are pulling data from a large list in multiple locations or connecting to data sources that reside outside of SharePoint.

Visuals and graphics

Microsoft also recommends that interactions between visuals are limited. Visuals within Power BI can interact with one another by default, though it is best to limit this or eliminate this visual interaction altogether to optimize performance.

Within Power BI, you can create customized visuals, but it is a best practice to use the Microsoft app source certified custom visuals since they have passed rigorous testing and are less likely to negatively impact your SharePoint environment.

Access management

Remember that embedding a Power BI report into SharePoint does not automatically give the user access to your data. Power BI reports are still subject to the security trimming within SharePoint. So, if you are using this function to allow users to view data that is being pulled from a source, you must make sure that they have the access to do so. This access management consideration is important for all aspects of your migration, upgrade, or new solution configuration. However, this is something that the average user may not think about before a feature goes live. You must think about this.

Many companies nowadays are moving toward a centralized Access Management Control Model where access may be configured through the Identity Access Management team and provisioned through Active Directory groups. This may add more of a lead time requirement to your report rollout, so please plan for this ahead of time.

If you have not moved to the cloud yet, the first step you will take is to look at your Active Directory structure and the email you wish to migrate. Once that has been established, you can build from there. If you do have these resources in the cloud, you can still use Active Directory from the cloud to manage resources in your on-premises environment. SharePoint can use these security resources to secure content.

Performance impacts and testing

Calling and retrieving very large datasets can have a real performance impact on your SharePoint environment. Do not underestimate this impact. It may seem slight to you as you set up and configure these services in the environment, but a delay of a few seconds is extremely noticeable for users that are in and out of sites and report many times throughout their workday. Even small lags in performance can impact productivity over time. This impact is exacerbated when you are dealing with businesses that have very tight SLAs, such as banking.

Testing before rollout is the best way to mitigate this issue. In most instances, you will not have access to actual production data in your test environments. If you have the ability to use production data and this does not break any of the policies of the specific enterprise, then this would be the best option to test what effect the load reporting service configurations may have on your live production environment. If testing reports with actual data is not possible, try and replicate the capacity and utilization of the production environment as closely as possible.

Please engage your most intensive reporting users in your testing to gauge real-life scenarios based on how these users perform their day-to-day work. Also, if your enterprise has a Capacity Planning team and Quality Assurance team, it is recommended to involve them when planning and testing reporting solutions.

Performance Analyzer

The **Performance Analyzer** is a tool that can be used to examine report element performance within your environment. The analyzer records logs and measures different reports you have created, looking specifically at the report elements, and capture how they perform when users interact with the reports. The analyzer can also see what areas of the report resource are intensive. This will give you an insight into how these reports impact your environment.

The Performance Analyzer works similarly to the Load Testing product in Visual Studio. You can record your session so that you can interact with the report. When changing the way the report criteria interacts with data, you will see the analyzer recording those performance changes. The analyzer will then collect and display the results of your interactions when you run queries that pertain to the report.

As we've already mentioned in this book, performance is everything, especially when it comes to the support of your users. Always do testing and analyze things before they go into production. The better you can plan for these added reports, especially reports that deal with data, the better off you will be when these reports make it to production resources.

Power BI brings reporting to the forefront in the cloud. It really changes the game for on-premises environments. With the changes to server platforms and their removal, this brings hope for us to continue robustly reporting using cloud tools. There are other changes that have been made to the cloud platform that can help us start thinking about the cloud's direction. With SharePoint Designer 2010 going out of commission on the cloud, we must think about SharePoint Designer 2013, whose changes will be becoming more prominent soon. We will talk about replacements for these tools in the next section, which is all about Power Apps.

Power Apps

To provide rapid development for apps, Microsoft came up with a cloud application known as **Power Apps**. This application empowers users to create apps almost immediately. If you come from an InfoPath background, then this is your new buddy. Power Apps is not the same, nor does it have the same menu, so be prepared for a learning curve. Training is available to kick-start your knowledge at very low reasonable prices since COVID-19 and the push for virtual meetings.

Power Apps can be given to everyone or a subset of users in your company to help them develop applications that work for your organization. You can extend these apps with capabilities using Azure Functions and the use of custom connectors for on-premises systems. This gives the company a business transformation that enables it to see ROI quickly. It also improves employee productivity.

Again, Power Apps can be used with our on-premises environments through the On-Premises Gateway. This brings the power back to our server farms, which can be local to our server rooms or in the cloud. Remember that you must use modern sites and modern lists or libraries to use the tools within SharePoint 2019. We will talk about this in more detail in *Chapter 12, SharePoint Framework*.

When you log into Power Apps for the first time, you will see that there are a few ways to get started. You will have to choose an environment for the app to run in for security purposes. This could be internal for internal users or external if you plan to share information outside the organization. Choosing this option does not limit you because you can move apps between environments as well.

The options for creating new apps are as follows:

- Modern Apps
- Canvas Apps
- Portal Apps

Each option creates a different type of app. The most common is Modern Apps. You can also start from data, which gives you the option to select the data source first and then come back and create your app on top of the data source you've selected.

When you first open Power Apps, you will be prompted to create an app via Data Connection or via the Canvas, Model-driven, or Portal application models. The following screenshot shows these choices:

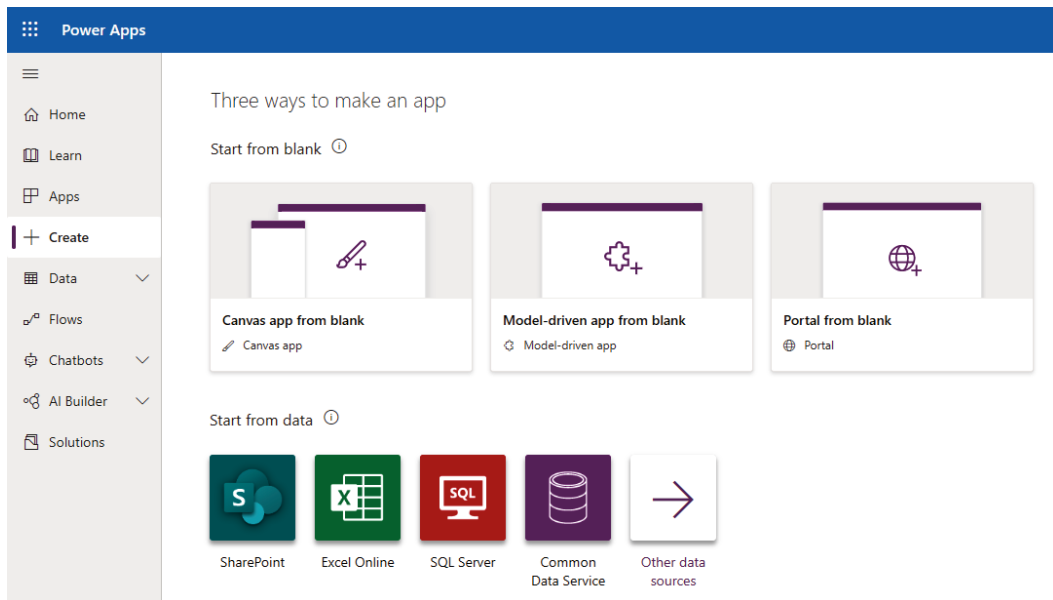
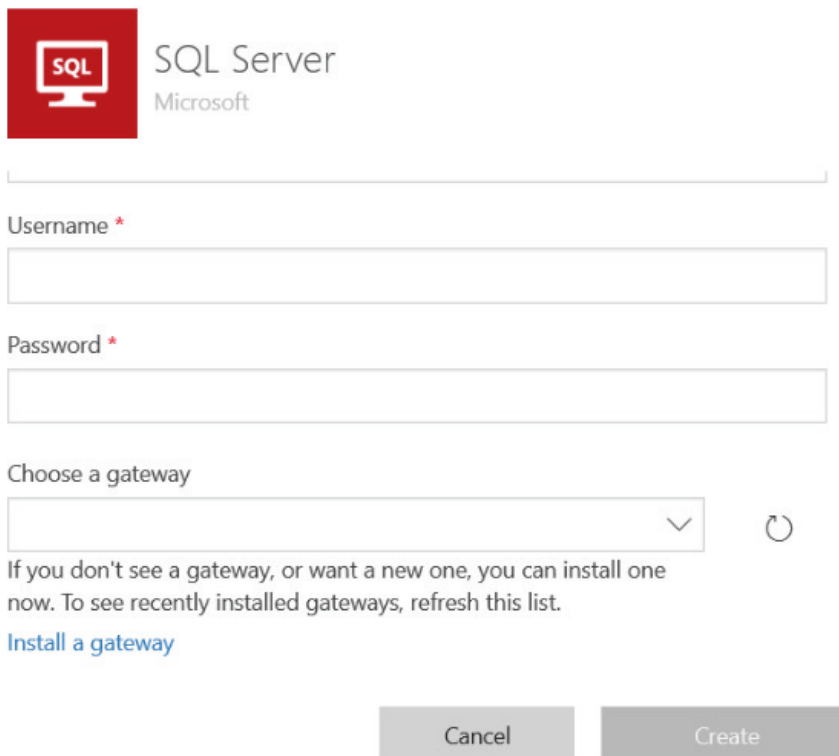


Figure 10.9 – Power Apps creation menu

Your data can come from the following connections:

- **SharePoint**
- **SQL Server**
- **Excel Online**
- **Common Data Service**
- **Other Data Sources** (this is where you will find the On-Premises Gateway)

When using an On-Premises Gateway, you must have set up the gateway first and have the necessary credentials to connect to the resources you plan to use to connect to the data you need. Once you have set up your On-Premises Gateway, you will be prompted to choose your SQL server, if that was the data source you were planning to use, by inputting its name, username, and password and then choosing the gateway you plan to use to connect to the data you are in need of:



The screenshot shows the 'SQL Server' connection form. At the top left is the Microsoft SQL Server logo. To its right, the text 'SQL Server' and 'Microsoft' are displayed. Below the logo is a text input field. Further down are two more text input fields, one labeled 'Username *' and the other 'Password *'. Below these is a dropdown menu labeled 'Choose a gateway'. To the right of the dropdown is a circular refresh icon. Below the dropdown, there is a message: 'If you don't see a gateway, or want a new one, you can install one now. To see recently installed gateways, refresh this list.' Below this message is a blue link that says 'Install a gateway'. At the bottom of the form are two buttons: 'Cancel' and 'Create'.

Figure 10.10 – SQL Server connection form

As you can see, the availability of using SQL Server or any other data resources on-premises is easy to configure. Once the gateway is in place, there is no limit to what you can provide as far as reporting using data internally or in the cloud is concerned. Even mixing the data to create robust reports is available in some cases.

Now that we have talked about Power Apps, we will look at other tools that can help automate those apps and make the information that has been collected in those apps come to life. Power Automate provides the tools for creating Flows, which bring data to life.

Power Automate

Power Automate is used as a workflow automation tool and is very useful for creating workflow triggers in SharePoint 2019 and SharePoint Online. Power Automate was known as **Flow** previously, and although the name has changed, its awesome functionality persists. Due to the deprecation of previous workflow solutions, such as SharePoint Designer and InfoPath, users and developers have started to rely more heavily on the new workflow tools available to them.

Although there are a few third-party products that have gained popularity, such as Nintex, if you want to stay within the Microsoft Suite for your workflow solutions, Power Automate is a great option. Keep in mind that if you wish to utilize Power Automate's tools, you will need a subscription. This is not a solution that is deployed directly into your SharePoint Farm and is part of the Microsoft 365 suite of products, which means there are fees associated with this product.

The following are some things you need to know when using Power Automate:

- Use a trigger to start a flow and an action to change data.
- You cannot pause a Flow, but you can KILL a Flow.
- Flows run for 30 days until timeout.
- Use Service Accounts to run your Flows.
- Use Shared Mailboxes when necessary.
- Retry policies on Flows is 90 times.
- Set timeouts on loops.
- You cannot remove an owner of a Flow, but you can change it using PowerShell.
- History is only kept for 28 days.
- Concurrent loops – 50.
- 500 action limits.
- You can call Power Automate Flow from another Flow (determine your strategy).
- REST only returns 100 items – you can use the Get-Item action and return more items using paging.

With the recent announcement of SharePoint 2010 workflows not being able to be created after September 2020 and not able to run at all after October 31, 2020, companies have been scrambling to find solutions that can help recreate those workflows and even InfoPath forms as well. Since it was such a surprise, many companies are utilizing Power Automate to make sure their current workflows and business processes do not fail.

Since this announcement, you may be wondering when InfoPath and SharePoint 2013 are going to be permanently retired from Microsoft 365. I believe it's coming as soon as 2023. I would start preparing those business processes so that they can also be converted. The issues that come into play when you have so many workflows is overwhelming. This also creates a big issue for those who have not migrated yet and have SharePoint 2010 workflows in their on-premises environments.

This brings about one of the big issues I saw, which was training the developers who have been using SharePoint Designer and how they are going to transition to these new tools. They are not the same by any means and you cannot expect developers to jump into this from one day to the next, especially during a migration. It's best to plan this upfront so that users can start playing with the tools early in the planning phases of the implementation. Do not wait until the last minute and expect developers to run with these tools like they have used them before.

I was recently working with a company that was just planning to move SharePoint farm content from 2013 on-premises to Microsoft 365. In the on-premises farm, they had well over 500 workflows within the web application. They had six web applications with many developers. This creates a big stink when you want to migrate and must remember that 2010 workflows do not work almost as soon as you migrate them to Microsoft 365. Support for them is still available in SharePoint 2019, but if your goal is to migrate one day and SharePoint 2019 is your bridge to that goal, make sure to plan early and understand that none of those workflows will move and work in the cloud after the dates I noted previously.

So, to solve this problem, the only thing you can do is recreate your workflows. The Power Automate workflow tool can be utilized by SharePoint On-Premises and SharePoint Online using connectors. In this context, connectors is a prepacked API that is used to communicate with and perform actions in the destination location. The following are some simple step-by-step instructions that show you how to connect Power Automate to a SharePoint list online and on-premises using the On-Premises Gateway.

When you log into Power Automate, you will see the following screen, which gives you options to start creating flows right away. This page also gives you access to templates that were pre-created by Microsoft to help you get started as well:

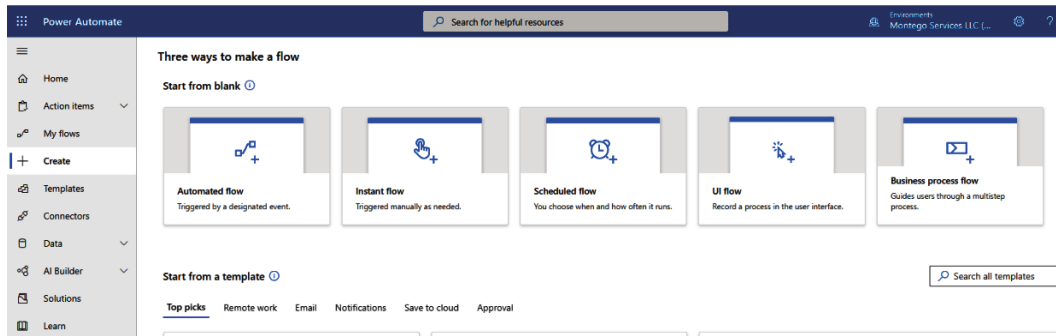


Figure 10.11 – Power Automate creation screen

The power of Power Automate is its flexibility and how it gives you many options to use the platform to create workflows. I was amazed because it incorporated one of my PowerShell features where you "try-catch". If used correctly in PowerShell, you could end up with errorless scripts. In Power Automate, you can also use the Run After feature to set up relationships and run a sequence of rules between actions. So, if an action has been completed successfully, failed, skipped, or has even timed out, you can set triggers to determine how you handle those types of errors.

There are many ways you can start creating flows within your company. As shown in the preceding screenshot, you can create the following:

- **Automated flow**
- **Instant flow**
- **Scheduled flow**
- **UI flow**
- **Business Process flow**
- **Start from a template**

This should give you a basic overview of how to started with Power Automate. Depending on the solution you are trying to create, you could use any of these to start creating flows to automate business processes. The goal of this book is to let you know about SharePoint 2019 and how we can leverage the cloud so that we can use our on-premises resources with cloud applications. Due to this, I will not be going into these topics in more detail. However, we will learn how to connect Power Automate to our on-premises data sources and SharePoint resources. We will cover this in the next section.

Connecting Power Automate to SharePoint Online

To show you how easy it is to create a workflow using Power Automate, follow these simple steps to create a Power Automate flow that connects to a SharePoint Online site:

1. The **Power Automate** tool must be launched from the **Power Automate** website at <https://flow.microsoft.com/en-us/>. Log into the Power Automate website.
2. In the top-right corner of the **Power Automate** website, you will see a gear icon just like the one you are familiar with from SharePoint. Select it.
3. Once you've selected the gear icon, you will see a dropdown that provides a few options. Select the **Connections** option.
4. Select **Create connection**.
5. You will see a list of available connections. In this instance, we want to select SharePoint.
6. Select the **Create Connection** button. Then, click **Set up your connection to SharePoint**. Once you have selected a connection, choose a site within the SharePoint Online environment.

Connecting to a SharePoint On-Premises environment

To get you more familiar with how easy it is to connect to on-premises environments, follow these simple steps to create a Power Automate flow that connects to a SharePoint On-Premises site:

1. To connect to the SharePoint On-Premises environment, you need to log into the **Power Automate** website at <https://flow.microsoft.com/en-us/>.
2. Select the gear icon and select the **Connections** option.
3. Click **Create connection**.
4. Power Automate will now be connected to your on-premises environment through an on-premises data gateway. Power Automate supports SQL Server and SharePoint Server On-Premises data gateways.
5. From the available connections, list select **SQL** and select the option to connect through the on-premises data gateway or SharePoint On-Premises. This option will be featured as a checkbox.

6. You must provide your connection credentials and then choose the gateway that you want to connect to.
7. To check that the connection is successful, check **My connections**. You should see it listed.

Once connected, you will be able to utilize the tool by connecting to SharePoint On-Premises environments to create workflows that work specifically for your on-premises content. This gives you the opportunity to update those old workflows and build out with the newest tools from Microsoft.

Power Automate Desktop

There is also a new Power Automate Desktop application where Robotics Process Automation is at your fingertips. This new desktop tool was announced in preview September 22, 2020 and is exciting news. The possibilities are endless with this tool in hand, especially for those who aspire to learn about robotics. This platform supports coders and non-coders. To learn more, go to <https://docs.microsoft.com/en-us/power-automate/ui-flows/desktop/introduction>.

Office Online Server

Office Online Server is the next version of Office Web Apps. Office Web Apps was used in older versions of SharePoint so that users could view Microsoft Office application content, including Word documents, PowerPoint presentations, and Excel documents within their browser. Office Online Server is an on-premises product and is compatible with SharePoint 2019.

There have been some updates to the product and one important one to me is the ability to protect the installation of Office Online Server. There is a feature where you can restrict which servers can join the Office Online Server farm, such as SharePoint and other Microsoft products. You can base this on OU membership and prevent unauthorized servers from joining.

There have been some updates to how Office components work as well, and these are distributed across the enterprise. This product allows Exchange Server and Outlook Web App to preview Office file attachments. Excel Online is the replacement tool for Excel Services in SharePoint and has now been moved to Office Online Server as of SharePoint 2016.

The product still allows external data connectivity and data refresh features, as provided in the past versions of SharePoint for services such as Excel Online. Office Online Server only works with SharePoint web applications that use claims authentication. All other authentication methods are not supported.

Office Online Server not only allows you to view content – it also allows you to edit content. It provides support for PCs, tablets, smart phones, and many different mobile device platforms. There may be differences due to the browsers supported by those device platforms, and testing would need to be done to figure out what is supported by Microsoft. Language packs are used to enable users to view files in multiple languages.

Office Online Server has a small footprint on a server and should be set up on its own resource. I do not advise trying to add this component to a SharePoint server or install any other applications with this application when running it on its own server. All integrated products, including Workflow Manager, should all be separated onto their own server resources.

You can install the services on multiple instances of this server to support redundancy. Providing that type of support for the product would depend on how big your organization is. If you need to grow this server platform out, you have the options to do so later as our organization grows as well.

If you are planning to provide redundancy, you will probably want to add a load balancer. **Windows Server (IIS)** solution using Application Request Routing are supported for this. You can run this IIS role on one of the servers Office Online Server is running. DNS will come into play, as well as certificates, to help resolve to the IP address of the load balancer.

As part of the planning process for this product, you should use the same minimum requirements for a server as you would for SharePoint Server 2019. The product is only supported on Windows Server 2016 and Windows Server 2012 R2. So, when installing this server, you cannot use Windows Server 2019 OS to do so. To support the server correctly, you need to install the server OS as Server with Desktop Experience, which is an option for Windows Server 2016 if you're using that OS.

As with any application server, there is maintenance that comes into play when you're supporting this server installation.

Note

The following is a link to the Office Online Server release schedule: <https://docs.microsoft.com/en-us/officeonlineserver/office-online-server-release-schedule>.

Some of the best practices to follow when running this server are as follows:

- Do not install any applications that need support for ports 80, 443, or 809 on these servers.
- Do not install any versions of Office products on this server. If installed, uninstall Office before you install Office Online Server.
- Do not install Office Online Server on a domain controller as the product will not run on a server hosting Active Directory Services.
- Configure the product for HTTP or HTTPS requests.

To install the application, Office Online Server must be deployed on your network. Then, you can configure the server so that it works with SharePoint 2019. If you are planning to deploy Office Online Server, make sure that you have enough memory on the servers you are deploying.

If you do not have enough memory on your farm's server resources, certain functions, such as previewing documents, will fail to work. I had a failure when deploying a Skype test server and I recommended minimum memory requirements and was given 4 GB of RAM. When I tested Skype, I had issues with the scheduling process within Outlook and kept seeing the presence of users online. After a long 4-week process with Microsoft, it was found that due to not using the minimum amount of memory required as a best practice, these processes were failing.

This all goes back to the earlier warnings and advice that you received in this book – you must make sure you are aware of the best practices and what you are actually building as it could impact the amount of server resources needed; that is, your CPU, RAM, and storage. Make sure to pay close attention to these details and test all areas before launching.

Also, it is highly advisable that your farm is configured over a secure port using HTTPS and the latest TLS configuration. This is because Office Online Server uses OAuth tokens to communicate with the SharePoint 2019 server. This can cause an entry point of attack into your environment if your environment is not configured on a secured port. To configure Office Online Server, follow these instructions:

Prerequisites:

- Windows Server 2012 R2 or Windows Server 2016
- 16 GB of RAM, 4 CPUs, and 100 GB or more hard drive space
- Use your SharePoint Admin account to perform the installation (you must have admin rights on the server)

Install:

1. To install **Office Online Server**, you need to get the required license and download it from your **Volume Licensing Service Center**. **Office Online Server** is a component of Office, so it will be included under **Product pages** for Office in your Service Center.
2. Once you have downloaded the product, run the `Setup.exe` file.
3. Accept the terms and licensing terms and click **Continue**.
4. Choose a file location for the installation (it is recommended that you install it on your system drive).
5. Click **Close** to complete the installation.
6. Using Kerberos Constrained Delegation with Excel Online, you must set the Windows Service (Claims to Windows Token Service) so that it starts automatically.

If you are not familiar with Office Online Server and it is not available from your company download location at Microsoft, please remember to get specifics on how to access the download so that you can install and deploy the application.

Deploying Office Online Server:

Before you can use PowerShell to manipulate Office Online Server, you must import the `OfficeWebApps` module into your server using the following command:

```
Import-Module -Name OfficeWebApps
```

Creating the Office Online Server farm:

To create a single farm with a single server, use the following command:

```
HTTP: New-OfficeWebAppsFarm -InternalURL "http://servername"  
-AllowHttp -EditingEnabled
```

```
HTTPS: New-OfficeWebAppsFarm -InternalUrl "https://server.  
contoso.com" -ExternalUrl "https://wacweb01.contoso.com"  
-CertificateName "OfficeWebApps Certificate" -EditingEnabled
```

Verify that the Office Online Server farm was successfully created:

Go to the following URL from a browser on your server: `http://servername/hosting/discovery`.

You should see the following page in your browser:

```
<?xml version="1.0" encoding="utf-8" ?>
- <wopi-discovery>
- <net-zone name="internal-http">
- <app name="Excel" favIconUrl="http://servername/x/_layouts/
images/FavIcon_Excel.ico" checkLicense="true">
<action name="view" ext="ods" default="true" urlsrc="http://
servername/x/_layouts/xlviewerinternal.aspx?<ui=UI_
LLCC&amp;><rs=DC_LLCC&amp;>" />
<action name="view" ext="xls" default="true" urlsrc="http://
servername/x/_layouts/xlviewerinternal.aspx?<ui=UI_
LLCC&amp;><rs=DC_LLCC&amp;>" />
<action name="view" ext="xlsb" default="true" urlsrc="http://
servername/x/_layouts/xlviewerinternal.aspx?<ui=UI_
LLCC&amp;><rs=DC_LLCC&amp;>" />
<action name="view" ext="xlsm" default="true" urlsrc="http://
servername/x/_layouts/xlviewerinternal.aspx?<ui=UI_
LLCC&amp;><rs=DC_LLCC&amp;>" />
```

Secure Store Integration (Optional):

If you need to configure Secure Store access for Excel Online, then you need to run the following command for all connections to the Secure Store Service:

```
Set-OfficeWebAppsFarm -AllowHttpSecureStoreConnections:$true
```

Adding servers to the Office Online Server farm:

To add servers to the farm, you can follow the same steps for installing and then use the HTTP or HTTPS method of creating the Office Online Server farm on the new server:

```
HTTP: New-OfficeWebAppsFarm -InternalURL "http://servername"
-AllowHttp -EditingEnabled
```

```
HTTPS: New-OfficeWebAppsFarm -InternalUrl "https://server.
contoso.com" -ExternalUrl "https://wacweb01.contoso.com"
-CertificateName "OfficeWebApps Certificate" -EditingEnabled
```

Adding a server to the farm:

Use the following command to add a server to the farm:

```
New-OfficeWebAppsMachine -MachineToJoin "server1.contoso.com"
```

To verify that the server is running, follow the same steps we followed for the first server we created.

Configuring Office Online Server in SharePoint 2019

First, you will need to create a binding between your installation of Office Online Server and SharePoint Server 2019. To do this, follow these steps:

1. Open SharePoint Management Shell and choose **Run as Administrator**:

```
New-SPWOPIBinding -ServerName <WacServerName> -AllowHTTP
```

This command will allow SharePoint Server 2019 to receive information from Office Online Server.

2. Check if WOPI is using the default internal HTTPS zone:

```
Get-SPWOPIZone
```

The result that we are looking for here is `internal-http`. If the shell results show `internal-https` and not `internal-http`, then we must perform an additional step. If your results are showing `internal-http`, you can skip the next step.

3. Switch WOPI to `internal-http`:

```
Set-SPWOPIZone -zone "internal-http"
```

```
(Get-SPSecurityTokenServiceConfig).AllowOAuthOverHttp
```

Once your deployment is completed, make sure that you have tested Office Online Server in your SharePoint environment. Test the URL for Office Online Server to make sure you can get to the URL successfully. Also, ensure you can connect to this URL from your SharePoint servers: `http://servername/hosting/discovery`.

Make sure that your users are testing this thoroughly. You should set up your test scripts and make sure that all the functionality of Office Online Server is working properly before it is fully released to the user community.

Once you have installed Office Online Server, you can configure the different components within the server. In the next section, we will cover Excel Online to give you a short overview of what this server can provide.

Excel Online

Excel Services has changed immensely and if you offer these services as part of your SharePoint 2019 deployments, there are many changes you need to know about and understand. It was moved outside of SharePoint in the SharePoint 2016 version of the product. Excel Online includes many of the same features Excel Services included in SharePoint Server 2013, such as external data connectivity and data refresh features.

Data refresh in Excel Online is supported only on SQL Server and SQL Analysis Server. There are steps you can follow to setup data refresh, from creating a workbook to setting the workbook's refresh based on the data source. Refreshes can only be triggered in one of two ways:

- The end user opens the workbook
- The end user clicks on the refresh button on an open workbook

Office Online Server can communicate with SharePoint servers, Exchange servers, and Skype for Business servers by using HTTPS protocol. This should be the way environments are set up in a production environment as it helps secure communication between the servers. Certificates will need to be installed either on the server (IIS) or on a load balancer if you're using multiple servers.

With this new version of Excel Online, you can adjust the resource usage of your Office Online Server farm. These PowerShell commands give you the opportunity to enforce governance over the services provided by this server or server farm. This really helps make this farm better suited to support your users and the performance and stability of the services provided.

Excel Online supports the following connections when it comes to connecting to data sources:

- SQL Server Analysis Services
- SQL Server Databases
- OLE DB data sources
- ODBC data sources

Windows authentication and SQL authentication can be used to connect to external data sources through Excel Online. Kerberos delegation can be used as well as but requires that the **Claims to Windows Token Service** is running. Office Online Servers must be allowed to delegate to each backend data source, and the `c2wtshost.exe.config` file must be updated.

When using Excel Online workbooks, you can use two types of connections:

- **Embedded Connections:** Stored as part of the workbook
- **Linked Connections:** Uses an ODC file for enterprise-scale data sources

Note

Link to Plan installation: <https://docs.microsoft.com/en-us/officeonlineserver/plan-office-online-server>.

Applying updates to Office Online Server requires a maintenance window that should be in sync with your SharePoint maintenance. Automatic updates cannot be used for this product because the updates must be applied manually. If the updates are applied automatically, this could result in you having to rebuild your Office Online Server farm. Users may not be able to see documents at this point either. So, you want to make sure you are updating appropriately because in some instances, such as other servers, these servers require a certain process to be followed. PowerShell is used to apply updates to this server. Anything could come into play here, so research and be careful.

Azure reporting capabilities

Another powerful offering in the Microsoft cloud ecosystem is Azure. Azure was designed to help companies build and manage applications. It gives you a choice of tools to use, as well as frameworks. You also have the option to build applications that run across multiple clouds and on-premises enterprise systems while taking full advantage of Microsoft 365.

This platform just brings a solid anchor to the Microsoft cloud offering and allows so much creativity and many forward-thinking solutions to be brought to the table. Using these applications within Azure may reachitect how you have your current enterprise configured.

With these offerings, we also have the option to report using services such as Analysis Service and Logic App Service. These services allow you to analyze data and build apps across platforms and clouds while you're integrating with your on-premises environment. There are other services that cross the bounds of cloud and on-premises as well, such as Azure Information Protection, which is an RMS. This is another service that's available for security and data compliance. We will keep our focus on reporting in this section.

Azure Analysis Services

The On-Premises Gateway also provides you with access to data so that you can use it with Azure Analysis Services. You can transform complex data by combining data from a singular or even multiple sources into a trusted and secure BI model. Microsoft invested around 1 billion dollars a year into cyber security and has over 3,500 security experts working on this version of Azure alone, all to keep data secure and ease the minds of the users managing their private and sensitive data in this service model. Azure, as a platform, has many compliance certifications that help provide support for companies who require these certifications.

Microsoft guarantees speed and performance with this platform and is promising the fastest responses from the data you have combined to create complex datasets. You can get up and running quickly as you can create a server within minutes using Azure Resource Manager or PowerShell. You have full control of this service and you can scale up or down, pause, and resume the service whenever you need to. You only pay for what you use in cycles.

Azure Analysis Services also integrates with other services, which helps you be creative when planning analytics solutions for your company. There are also integrations with Azure Data Factory. This service is used to orchestrate and operationalize processes to refine enormous stores of raw data. Azure Automation and Azure Functions can be used with custom code for lightweight orchestration models.

Security for authorized users is managed within the Azure service and is role-based for separation of duties. Azure Active Directory is used to support role-based security, which helps keep user management an easy task. Using the cloud as an administrator should help you understand how to use Azure Active Directory and plan security accordingly.

There are three tiers available for use:

- **Developer:** Evaluation, development, and test scenarios.
- **Basic:** Used for production solutions on smaller tabular models and limited user concurrency.
- **Standard:** Mission-critical production applications with growing data models.

The product is supported in regions and there are plans that support query replicas, depending on the region you choose.

Tip

Please check the regions for availability at <https://docs.microsoft.com/en-us/azure/analysis-services/analysis-services-overview>.

Microsoft guarantees 99.9% availability and users can access this data from anywhere in the world. This self-service platform for data discovery can help you define the data in your company and find those areas where data still may need some cleanup. When I say easy to use, I am talking about the interface of Microsoft Visual Studio, which is the interface that's used to work with this product. This way, your developers do not have to learn about any new interfaces in order to work with the data within your environment; they should be familiar with this interface already.

The application is robust and can be scaled to match your business needs. It also provides life cycle management capabilities for the following areas:

- Governance
- Deployment
- Testing
- Delivery

The easy-to-use platform is for those who have used Visual Studio in the past. The application service is free with no obligations but once you start to use it, you will be charged for what you use. You will have to use SQL Server 2016 Enterprise Server to use the product as this is the version of SQL that's supported. If your SQL Server is on your on-premises network, this is when the On-Premises Gateway helps you connect to those databases that hold data, so you may want to fully expose it in the cloud. SQL Analysis Server supports tabular models at the 1,200 and higher levels. Both direct query and in-memory are supported.

Azure is not well-known by some customers because they never planned to use its services. The problem with being closed-minded and only looking at Microsoft 365 as a target solution is that you miss out on some of the benefits Azure provides natively to the cloud platform. It really can open a new world of supported applications and security to your company that you may never actually investigate. Let's look at another option that works with the On-Premises Gateway.

Azure Logic Apps

If you want to use scheduling, automate tasks, and easily create business processes and workflows, get acquainted with using Azure Logic Apps. You can integrate other apps, data, systems, and services across your enterprise or organizations, including on-premises enterprises. This is where the On-Premises Gateway becomes effective.

I really believe that business automation tools are very helpful and can help you build business processes that support your workforce and customers. You can use the tools provided by Azure Logic Apps to do the following in your business:

- Process and route orders
- Send email notifications
- Integrate with Microsoft 365 services and data
- Manage files
- Provide secure access
- Process data
- Monitor other applications
- Use the many connectors to connect to other services, apps, and data

Some of the many connectors available are as follows:

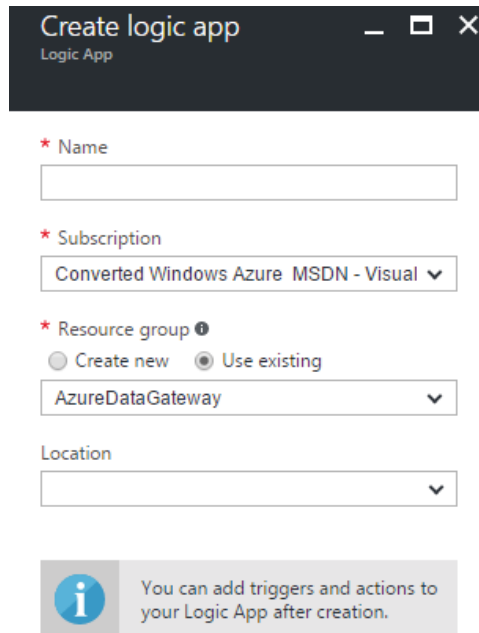
- Azure Service Bus
- Azure Functions
- Azure Storage
- SQL Server
- Microsoft 365
- Dynamics
- Salesforce
- BizTalk
- SAP
- Oracle DB
- File shares and more!

The interface for Azure Logic Apps reminds me of Power Automate. It has a similar interface with deeper functionality than Power Automate, which helps you create robust customized solutions. The process uses triggers that respond to events that happen in the created business process, which could be a choice in the logic of the app by the user. By using the templates and recurrence triggers for more advanced scheduling, no code needed in most instances.

There are a few ways to interface with this product to create automation:

- Logic Apps Portal (Logic Apps Designer)
- Visual Studio
- Visual Studio Code
- ARM Template
- Azure CLI

You will have to create a Logic Apps Custom Connector to use Logic Apps over an On-Premises Gateway. Once the On-Premises Gateway has been created, it will be available in Azure apps and Microsoft 365 apps such as Power Apps, Power Automate, and Power BI. Once you have that resource available, just select it from the menu as your resource group:



The screenshot shows the 'Create logic app' form in the Azure portal. The form has a dark header bar with the title 'Create logic app' and the subtitle 'Logic App'. Below the header, there are several input fields and a message box. The fields are: 'Name' (required, indicated by a red asterisk), 'Subscription' (required, indicated by a red asterisk, with a dropdown menu showing 'Converted Windows Azure MSDN - Visual'), 'Resource group' (required, indicated by a red asterisk, with radio buttons for 'Create new' and 'Use existing', and a dropdown menu showing 'AzureDataGateway'), and 'Location' (with a dropdown menu). At the bottom, there is a message box with an information icon and the text: 'You can add triggers and actions to your Logic App after creation.'

Figure 10.12 – Creation page for Logic Apps

Once you have selected the resources group, create your connection to the SQL server hosting your data or whatever connection your area is looking for within your on-premises environment:

SQL Server - Get rows

GATEWAYS

☒ Connect via on-premise data gateway ⓘ

* SQL SERVER NAME

* SQL DATABASE NAME

AUTHENTICATION TYPE

Windows ▼

* USERNAME

* PASSWORD

* GATEWAY ▼

Create

Figure 10.13 – Connection information form

You can then connect to the following supported systems using the On-Premises Gateway:

- BizTalk Server 2016
- File System
- IBM DB2
- IBM Informix
- IBM MQ
- MySQL
- Oracle Database
- PostgreSQL

- SAP Application Server
- SAP Message Server
- SharePoint Server
- SQL Server
- Teradata

This sums up the available options for creating reports and connecting to data from on-premises resources. Again, you can do this using your companies' location, where you have a data center, or through Azure, AWS, or another cloud service provider. There is no end to the possibilities. It is all about what you want as an architecture to support your users and the company's assets.

Summary

In this chapter, we have looked at the many changes that have been made to the BI and application reporting structures in SharePoint 2019. Microsoft has moved in a new direction and removed much of the BI functionality from its former integration into SharePoint. Now, the services must be connected to from the cloud or even separate servers to our SharePoint 2019 farm. This change also complicates your overall migration strategy as these changes must be planned for. This adds a measure of complexity to your migration.

For instance, if you want to migrate SSR reports from previous versions of SharePoint, you would need to do this by utilizing the migration script referenced in this book. This script is provided by Microsoft and is also linked and available on the Microsoft website. It is best to inform your user community of the BI reporting changes that Microsoft has made before migration, and then get your user community accustomed to the deprecated and removed features and the changed functionality of some of the BI processes that they have gotten used to. I am a firm believer that if this is planned for and laid out in the beginning and surprises are minimized, you will greatly increase the satisfaction of your user group.

Microsoft's overall strategy of removing a lot of the BI integration from within SharePoint is a good one from an enterprise standpoint. This perspective can be used as a great selling point when dealing with prospective clients. Most enterprises utilize various applications and if they are explained and demonstrated properly, the enterprise will welcome the opportunity to have these various systems connected to a centralized business intelligence reporting source. Highlight the positive aspect that these centralized business intelligence data and reporting services will help consolidate data reporting within their organization and could also help minimize the redundancy of these types of tools going forward.

In the next chapter, we will talk about the User Interface and Developer frameworks that can be used within SharePoint 2019. Things have changed drastically, and we need to make sure we explain how the modern and classic sites work, as well as how developers can make changes to the sites. This is an important chapter since admins and users need to understand the possibilities this brings to farms and where their skill sets must be updated to support the new platform. The tools listed in the next chapter bring on a whole new level of training and understanding as they are different from the legacy tools that supported SharePoint in the past.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. In SharePoint 2019, SSRS can be installed in Integrated Mode on a SharePoint server.
 - a) True
 - b) False
2. Office Online Server is the new version of which Microsoft product/component? Choose the best answer.
 - a) Excel Services
 - b) Office Web App
 - c) Power Pivot
3. What are "connectors" in the context of Microsoft's Power Automate interaction with SharePoint?
 - a) Connectors are the method that SharePoint uses to integrate with Power Automate.
 - b) Connectors are prepacked APIs that Power Automate uses to communicate and update SharePoint.
 - c) Connectors are used to update Power Automate to the latest version.
4. Using as many graphics/visuals in your Business Intelligence solution will have zero impact on performance.
 - a) True
 - b) False

5. Report Builder remains integrated with the latest version of SharePoint 2019 On-Premises SharePoint 2019.
 - a) True
 - b) False

Further reading

Please visit the following links to learn more about Azure AD.

Hybrid identities and authentication:

- <https://docs.microsoft.com/en-us/azure/active-directory/hybrid/whatis-hybrid-identity>
- <https://docs.microsoft.com/en-us/azure/active-directory-domain-services/tutorial-create-forest-trust>
- <https://docs.microsoft.com/en-us/azure/active-directory/fundamentals/active-directory-access-create-new-tenant>

More information about how to install the Hybrid Picker can be found at <https://docs.microsoft.com/en-us/sharepoint/hybrid/configure-inbound-connectivity>.

You can learn more about the Power Automate desktop offering here: <https://flow.microsoft.com/en-us/blog/jumpstart-your-business-with-power-automates-new-desktop-rpa-solution/>.

To create your first Azure Logic App, check out these links:

- **Using the Portal:** <https://docs.microsoft.com/en-us/azure/logic-apps/quickstart-create-first-logic-app-workflow>
- **Visual Studio:** <https://docs.microsoft.com/en-us/azure/logic-apps/quickstart-create-logic-apps-with-visual-studio>
- **Visual Studio Code:** <https://docs.microsoft.com/en-us/azure/logic-apps/quickstart-create-logic-apps-visual-studio-code>
- **ARM Template:** <https://docs.microsoft.com/en-us/azure/logic-apps/quickstart-create-deploy-azure-resource-manager-template?tabs=azure-portal>
- **Azure CLI:** <https://docs.microsoft.com/en-us/azure/logic-apps/quickstart-logic-apps-azure-cli>

11

Enterprise Social Networking and Collaboration

Microsoft Teams has become an instant hit for social collaboration, using SharePoint Online as the backend for the application. The replacement for Skype has brought on new features that make collaborating in the cloud even more collaborative. Microsoft Teams has really taken over the social collaboration space and has overtaken the top sellers in this market, including Slack.

The reason for its success is its features and ease of use. There are so many great things to talk about with this product and we plan to do a thorough job of running through its features. From instant messaging and telephony to integrated apps, the product has really included a list of great features. We will also talk about the downfalls as well where the product could be improved and support an even more collaborative vision.

We will also look at how the product can be used to facilitate meetings and even large live events. The product gives a deeper functionality for providing support for businesses that need to manage events. There is a lot to get into but I will run through the setup of Microsoft Teams, including creating a visual and audio configuration, so that you can see the possibilities and the direction it can take you in supporting those services.

There are some features included that SharePoint offers natively that we will also talk about as some of these features have been deprecated. Yammer has some integrations as well with SharePoint 2019 and there are also Microsoft mobile capabilities that we can walk through that are native to SharePoint on-premises and social collaboration.

In this chapter, we will also look at the features of SharePoint 2019 and show how these products can be bridged together. Although Teams is a key component in the cloud, there are other features available that we can take advantage of to push the platform.

The following topics will be covered in this chapter:

- Social features in SharePoint 2019
- Microsoft Teams

Technical requirements

For you to understand this chapter and the knowledge shared, the following requirements must be met:

- 3–5 years of SharePoint experience
- 1–2 years of Microsoft Teams experience

You can find the code files present in this chapter on GitHub at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Social features in SharePoint 2019

SharePoint 2019 was built to bring a bigger experience to the platform by integrating features that would expand on the collaboration features of the past. SharePoint is configured differently now than it used to be. Earlier, there were restrictions or, technically put, limitations on how you could integrate products and features.

As we look at where SharePoint was and where it is now, we can notice that all integrations are outside of the product and not included in the product's installation, or can't even be installed on the same server. Again, this helps with performance and keeps applications separated that could get messy when troubleshooting if installed together on servers. The cloud now provides some integrations, as seen in *Chapter 10, SharePoint Advanced Reporting and Features*, where we can use applications from the outside to manipulate data in our on-premises environment.

All the social features you have seen in other versions of SharePoint, such as 2016 and SharePoint Online, are available in SharePoint 2019. As we mentioned, where SharePoint 2019 enhances these features is with integration with other applications such as Yammer that push content to SharePoint through web parts and other integrations. We will talk more about this in this chapter but here is a short list of social features that are available in SharePoint 2019:

- Community features
- Company feed
- Follow features
- Microblogging
- One-click sharing
- Personal sites

Developers can extend these features by developing enhancements to make these features do more to support their users. With the use of APIs, the developer can start developing these enhancements. Using Visual Studio 2012 or newer, the platform is available for these enhancements; we will talk more about this in *Chapter 12, SharePoint Framework*. They can also use Power Apps, Power Automate, and other tools within Microsoft 365 to enhance the functionality of social features within SharePoint 2019 using hybrid connectivity.

Microsoft's direction in enterprise social networking

Microsoft's direction in enterprise social networking has become very clear over the last few years. Microsoft has taken a strong move away from collaboration silos. The traditional collaboration methods offered by Microsoft and utilized within many organizations required several different applications to cover the communication and collaboration needs of a company.

Most companies would have their Outlook application, Lync/Skype client, Yammer, and browser Office clients, which of course included SharePoint, primarily for document collaboration. Although there have always been plugin methods to integrate SharePoint and Outlook, most enterprise users have been forced to hop around to different locations to fulfill all their social networking and collaboration needs.

Now we see how, with new social applications, users can stay in one application such as Microsoft Teams and do not have to hop around to find information. A bridge has been created where we can pull in information from other apps and bring them into Microsoft Teams, including SharePoint, which makes the user experience so much easier and saves time when users are looking for information.

The user experience is enhanced by Microsoft offering mobile apps for SharePoint and Microsoft Teams. This gives users access to these applications from their mobile devices and they are able to access meetings and information from anywhere. Yammer also has a mobile app and you could create your own app using Power Apps or, using other development languages, you can create single sign-on access to protect access from the internet into the company tenant, using Intune and Azure to host the mobile connectivity.

We believe we will see more of this as some of the social networking tools get more enhanced and bring more collaborative functionality to the table. It seems the goal of all this is to be able to share anything with people internally or externally securely, which is a great step in the right direction. Everyone seems to love these new features and cannot wait to see what is yet to come.

Microsoft Teams overview

Lync and Skype have been long regarded as the kings of instant messaging and meeting feature applications for Microsoft, until now. Microsoft Teams has come on the scene strong and is bringing a bigger experience and giving tighter integration with SharePoint. When mentioning those applications, we must also mention Yammer. This social app has also been used for social interactions but in a different way. We see the need to explain how Yammer works so that you can see the differences and why they are both used together.

Yammer is used primarily for organizational communication and engagement. You would find Yammer content open to everyone in your organization. As stated, when you work with larger groups of people and content is everywhere, you may see a posting of Yammer content as you surf your SharePoint site. These posts would contain organization-wide information, which can include conversational or professional information and is not suitable for confidential content.

This comes into play where maybe you have IT teams that are separated across the company. In that scenario, you may have SharePoint admins in different departments that run their own farms. Using Yammer, you can create an organizational space where they can share ideas and information through the social networking tool.

We apologize but we do not have enough page space in this book to dig deeper into this to show more ways of how Yammer can be useful in on-premises environments and how it can be easily integrated with SharePoint 2019. Research to find out how Yammer can help your organization along with Microsoft Teams.

There is also another social tool that needs to be mentioned, and that is a mobile app built and supported by Microsoft named Kaizala. Kaizala is a group communication and work management tool used for secure mobile messaging. It provides a chat interface to securely connect to colleagues, vendors, distributors, and other resources a person may need in and out of your enterprise.

Kaizala gives you options to send invoices, and other Kaizala actions can be used within the app. You can schedule work, provide training materials, or even send attachments for review by other colleagues. Polls and surveys are also available and these types of communications can be sent to thousands of people. This app is an alternative to other social media-type applications we can use within the Microsoft 365 cloud. In the case of SharePoint 2019, you must be on a hybrid configuration to take advantage of Yammer, Kaizala, and other apps like SharePoint as well. These all are supported through hybrid connectivity.

If you look at the other tools, Yammer and Kaizala, you will see that they both work for large-scale communication, more like enterprise communication tools. Microsoft Teams works better for projects and smaller teams of people within your organization, as you will see in this section. Those teams that are created are used mostly to support projects or departments within the organization. This is a smaller group of people, so responses would be quick, and you will only find yourself using Teams when you are working on projects or working with these small groups of people.

When Microsoft Teams is rolled out in an organization, so is SharePoint Online, technically, because behind every Microsoft Teams workspace is what we traditionally know as a SharePoint team site. This is important to remember and drive home with your users and management teams as they need to understand that with each team comes a SharePoint site. You could end up with many sites that you know nothing about as an administrator.

The other thing that admins need to be aware of is that Microsoft Teams only authenticates using Microsoft Azure **Active Directory (AD)** authentication. So, when using the product for an on-premises SharePoint farm, that farm also needs to use AD in the cloud. So, the dependency on using Teams within your on-premises environment is using Azure AD.

The reason why you want this integration is to get the presence feature working in your on-premises environment seamlessly. This would require user profiles to import users from AD in the cloud, and if you want to make an even tighter integration, use the hybrid features within SharePoint 2019 to bring it all together, integrating OneDrive and other great features.

While Microsoft Teams is an amazing interface that offers a lot of different collaboration tools under a single moniker, it is not a replacement for SharePoint. I have seen some confusion around this as management in certain organizations are solely focused on reducing redundant applications and some may wrongly believe that if Microsoft Teams is adopted, then Microsoft SharePoint disappears, yet that is simply not the case.

Use both collaboration tools for different types of collaborative options. SharePoint is used for a more advanced set of features, such as document sharing, departmental sites, libraries and lists, and automated business processes on a large scale that work to create collaborative interactions with departmental technology.

Use Microsoft Teams for meetings, project calendars, messaging, and keeping related files associated with the project or team in the SharePoint site associated with the team. With this use of collaboration tools, it seems to me to be more project focused but has some organizational areas it supports, such as meeting technology.

Bridging these two applications together creates a full, powerful collaborative experience. This is why you see more and more people flocking to the Microsoft cloud because the tools are powerful and can create a sense of your company being large but you are actually small due to the technology behind your company.

Microsoft Teams in the age of the pandemic

As everyone is aware, we were all recently blindsided by the COVID-19 pandemic. This pandemic illustrated the uncertainty not only in our personal lives but in our working lives as well. Many people were impacted by the onset of COVID-19 and there was a great loss of jobs in many areas. However, this impact was lessened a bit by using virtual technologies and social networking capabilities to keep businesses functioning and to keep people at work and school safe by social distancing using working from home. Microsoft Teams was the shining star in the midst of this need for rapid adaptation. Companies, schools, and government agencies alike leveraged the power of Microsoft Teams to keep functioning.

Users can communicate through Microsoft Teams using the chat functions that Lync and Skype historically provided. Businesses can also host meetings, both video calls and audio, through the Microsoft Teams platform. This function was typically handled by Cisco Webex functionality, GoToMeeting, and other virtual meeting platforms. Microsoft Teams also allows users and groups of users to access, view, and edit SharePoint documents right from the Teams interface. The Microsoft Teams platform can also be integrated with Outlook so that your email messages can be viewed from this single interface. Many other apps can be integrated as well, such as Salesforce, Power Apps, and so much more, which brings a new meaning to collaboration.

SharePoint and Microsoft Teams

With the introduction of Microsoft Teams, organizations are now able to meet all their social networking communication and collaboration needs in one place. This will allow users to focus on the tasks at hand with all the information organized within a single location where all the messages, documents, notes, and chat conversations are accessible in real time to members of the team. For SharePoint, this means that each created team is associated with a SharePoint Online team site and each channel within that team is associated with the SharePoint site's document library. We will explore the concept of a "team" and a "channel" later in this chapter. For now, review the following chart to see a representation of the architecture of teams and channels in relation to SharePoint Online:

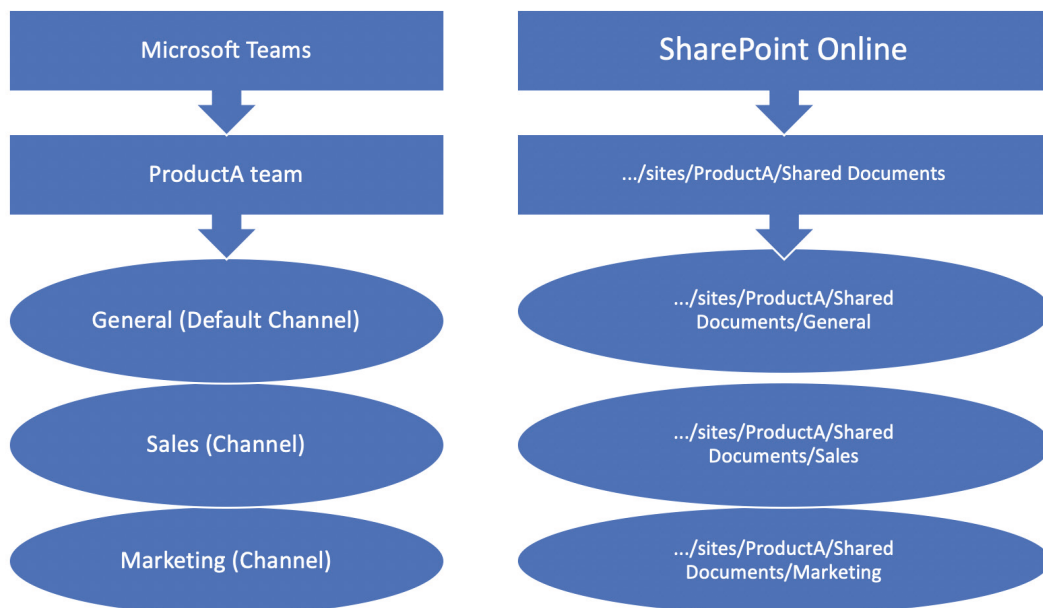


Figure 11.1 – Microsoft Teams versus SharePoint Online

As you can see, Microsoft Teams has very tight integration with SharePoint Online. When dealing with files in Microsoft Teams, any changes made to that file are made directly within SharePoint within the document library. This is not in sync with SharePoint as it is just that the file actually exists in SharePoint. The user also has the option to open the document in SharePoint and using this option will take them directly to their SharePoint Online team site, which corresponds with the team that was created in Microsoft Teams. There is also the option to add a SharePoint page tab in your Teams channel. If a page already exists within the SharePoint site, you can plug it in by adding it as a tab and view the information without having to visit the SharePoint site.

We are all familiar with the SharePoint failed newsfeed in conversations launched in SharePoint 2013. It failed when it was first launched due to the novelty of users playing around with the feature and those of us who presented the features of SharePoint highlighted this innovative feature to our customers. However, there was very low adoption in our opinion, and apparently in Microsoft's opinion as well, and this was due to the placement of the conversation and newsfeed option. It was placed outside of the actual working content and you could see the conversations on a site; however, this placement made the conversations within the newsfeed very general. Now, conversations can be placed alongside a specific document. I think that this is an amazing feature because it allows collaborators on a document to have real-time conversations about that document, thereby eliminating the need for emailing back and forth or Lync/Skype chat sessions that may be interpreted out of context without having the document readily available. The following is just a snapshot of some of the awesome features of Microsoft Teams as it relates to SharePoint:

- Open a document in SharePoint.
- Add a SharePoint page as a tab.
- Add a SharePoint document for view within a tab. This feature is useful for PowerPoint presentations or Excel spreadsheets that may be relevant to the team.
- Conversations alongside documents in real time.
- Coming soon! SharePoint web parts as tabs within Teams. This is great news and will open Microsoft Teams up to SharePoint development.

Understanding the differences between Microsoft Teams and SharePoint is critical because we want to make sure that we use the correct technology for the right purpose. Please make sure to review, document, and train users on how Microsoft Teams and SharePoint are different. It seems to be confusing for users what they can and cannot do in both applications. This is key to rolling out the application across your enterprise and if not explained, you can wind up with many Microsoft Teams SharePoint sites. So, now you are asked to spin up Teams in your company's environment; what do you do? Let's talk about the preparation and areas we need to be concerned about.

Tasked to suddenly roll out teams – now what?

As more people work remotely, many businesses have decided the best way to deal with this change and keep up employee connectivity within their enterprise is to roll out Microsoft Teams or greatly expand its usage if it already existed within their application suite. This change has left many IT administrators, particularly SharePoint administrators, scrambling to learn how to deploy and configure this platform rapidly.

While scrambling to acquire the knowledge to stand up a Microsoft Teams environment for your organization, you must not forget that governance is key to the long-term success of the rollout. All the administrative settings are in the cloud. So, there is no need, as in the case of an on-premises SharePoint 2019 environment, to set up a server or even integrate Teams one to one with SharePoint.

The activation of presence in an on-premises environment is done based on identity, as we talked about in the overview for this chapter. There are also key features in hybrid configurations that can be taken into consideration for further integration with the cloud, which is discussed in *Chapter 10, SharePoint Advanced Reporting and Features*. The key is to figure out how Teams works and what it provides as a service. Let's look at some of the areas we need to know about to move forward.

Governance

In this section, we will explore some of the governance features built into Microsoft Teams. Due to the rapid pace of the Microsoft Teams rollouts in many organizations, the governance of this platform became an afterthought. We highly recommend that if you are in the position to roll out your team's platform from the beginning and have time to do this properly, you consider the governance strategy for this platform beforehand. If you already have a governance strategy for your Microsoft 365 or SharePoint environment, this plan can be augmented to fit your Teams environment.

Since Microsoft Teams is most likely new to a lot of admins, decisions must be made about what type of identity model is supported in your organization, who will have what type of administrative access, whether conditional access provisioning is needed, retention and life cycle management, and a rollout communication strategy.

There are many areas to check but one of my pet peeves is not checking guest and external user access. You want to know who has access to your company's user community within the Microsoft Teams environment. The last thing you want is unwanted users contacting your users or even users sharing files outside the organization that are deemed intellectual property. There are other areas you need to make sure to check as well that concern how the application is set up. These are listed as follows:

- Team naming policies
- Team classification
- Team guest access
- Team creation
- Sensitivity labels
- Team expiration
- Retention
- Archiving

Make sure you do your due diligence on checking these governance areas. There are more as well within the Teams user settings that may need to be looked into to make sure you have complete control of what you want your users to have access to change.

Microsoft 365 licensing

Licensing comes with many options, but it all depends on what you need from the Microsoft 365 cloud, as applications are in some ways split by the following:

- The size of content needed to store
- By application

In a case where we would be looking at storage, this could be for email, OneDrive, or SharePoint, where we know that storage is key for documents and email. These applications that need storage may come at a higher price based on how much content you plan to store per user. In some cases, you may give some users a higher subscription and some a lower subscription depending on these two factors mentioned.

If you feel that by application is the more appropriate way to provide governance over subscriptions, then you would look at what applications are provided by which subscription model. This would be the case when you look at, for example, Microsoft 365 Business Basic, which includes Teams, Exchange, OneDrive, and SharePoint, but your users may need Microsoft Office as part of their subscription. In this case, they would need to buy Microsoft 365 Business Standard, which includes the four applications mentioned plus Microsoft Office apps at a higher price.

Please be aware of these pricing models as the subscriptions and pricing change; although they have not changed at this level lately, you will find that other apps outside of the subscription model, such as Stream, will cost you and those pricing models do change sometimes. You must be aware of these changes so that you understand your monthly bill.

Third-party applications

Microsoft Teams also provides ways to integrate outside applications and pull in data from those applications to present to a team within the Teams desktop. With those applications, you want to make sure that data from those applications is governed, as well as knowing what third-party apps are being used. Microsoft Teams gives you the option to control what apps are integrated with your Teams rollout and what users can or cannot use within the application.

Life cycle management

It is important to plan for life cycle management within Microsoft Teams. It may sound weird but there is a method to using this product where it can save you a lot of headache in the end. This is especially the case when there are a lot of teams and no one knows the status of the project or team's content.

All projects have a beginning, middle, and end because that is the way projects are rolled out in a company. The end date is an important date because that is when you expect the project to be completed and finished so that resources around it, be it IT or personnel, can be relieved from those projects and repurposed for other work.

Looking at Microsoft Teams, there are a few things we need to understand, which are teams and channels. Teams are the groups of users who are collaborating on the project. These users can be from any department within your company. Then there are channels, which split those users into their organizational groups or custom groups for targeted workloads.

Along with these areas, we must look at Teams access from a location standpoint, be it internal (private) or external (public) users. Then, we must also look at the types of roles we plan to include as part of the rollout of Microsoft Teams. Admins need these areas of coverage to support the service:

- Teams service administrator
- Teams communication administrator
- Teams communication specialist
- Teams communication support engineer

There are also other types of roles that need to be assigned to support members of teams, which we will talk about later in this chapter:

- Team creator
- Team owner
- Team member
- Guest

The life cycle follows a pattern as stated where you have a beginning, middle, and end of the project life pattern. Let's look at these three important parts in detail:

- **Beginning:** The beginning of a team would be to create the team. This would include several steps because you can also add an existing Microsoft group to a team or many of them. You can also create a team from scratch or add an existing team along with using APIs for Microsoft Graph teams to create teams programmatically. These teams would be created based on global address book attributes. Within the setup, we should also create channels and assign team members to those channels.
- **Middle:** The middle is used to describe the use of the Microsoft Teams product after it is set up. This would be the management of the application based on the team. Areas that need administration would be to update team members, update channels as needed, manage guests using the Microsoft Teams mobile app, and a few other areas of change and/or adoption with the product. This would also include users being more active using the product, which we want so that they enhance their knowledge of the product and build confidence with using the product successfully.
- **End:** After the use of a team has been completed, we must make decisions on how we handle the team's content. You need to make sure to get confirmation from the project leader or users before removing anything from the team. Closing these ended projects or teams makes sure that users do not get access to old content that is irrelevant to anything they are currently working on.

You can delete teams that you do not need. All teams are deleted as a soft delete, which you then have the option as an admin to reverse within 21 days. If the team is for a Microsoft 365 group, the reverse option is available for 30 days.

Retention policies can also be used to prohibit the deletion of teams. Policies can be added to teams or associated with SharePoint so that information can be retained for further time periods. Teams consist of files and content that need to be examined by the teams. Some teams may see value in different content and only want that content retained. This could be in SharePoint as well where you do not want things changed and kept in state going forward so that the information can be recalled if needed.

Some types of content that are captured by Microsoft Teams are as follows:

- SharePoint document library
- Conversations
- Planner boards
- Wikis
- Forms and the results
- Recorded meetings
- OneNote notebooks

In all the integrated apps, their content is retained in the app and not in Microsoft Teams. If you need that information, you should be able to either migrate it into SharePoint or keep it in the current app and pull it from that application when needed.

There are a host of new features in Microsoft Teams that you may want to look at for this purpose, which are listed as follows:

- Turn off message previews.
- Appear offline in Microsoft Teams.
- Change the notification settings.
- Team templates to change the way you work.
- Switch between devices while in a team meeting.
- The speaker name has been added to live captions.
- New keyboard shortcuts.

Now that we have our governance vision, let's look at access roles and the types of access we need to create.

Access

As we know, Microsoft Teams is a service that is only available in the cloud. However, this does not mean that you must have a cloud-only identity to access Teams. All the identity and access models allowed in Microsoft 365 are compatible with Teams. Even third-party authentication providers such as Okta are available to integrate with Microsoft 365 and your on-premises SharePoint 2019 environment for single sign-on.

However, if your access resides on-premises, for example, Windows AD, it must be configured within Azure AD. Azure AD was discussed in *Chapter 10, SharePoint Advanced Reporting and Features*, and briefly this chapter also offers knowledge on AD services, identity security, and application access management.

The following are the types of identity models supported by Teams:

- **Cloud identity:** Cloud identity is when the user is created and managed within Microsoft 365. Azure AD then stores this identity and manages password verification and security, giving access to various applications – in this instance, Microsoft Teams.
- **Synchronized identity:** The synchronized identity model is when the identity is managed and stored on-premises and accounts and passwords are synchronized to the cloud. This synchronization is done through Azure AD. This is the preferred method of most organizations for security reasons.
- **Federated identity:** With federated identity, the identities are still synchronized; however, the password is verified within the on-premises user store and/or through an online provider such as **Active Directory Federation Services (ADFS)**.

Most organizations go with the synchronized identity model for security reasons as stated. Organizations are becoming more open to cloud offerings; however, many prefer, and some are required by policy, to have their access identities remain on-premises and be managed by an identity access management team within the organization that is separate from the IT organization or the business users. Many organizations are even audited by outside governmental agencies to ensure that access to systems and applications is managed through identities on-premises and that segregation of duties is enforced.

By using Azure AD, these organizations can leverage powerful collaborative tools such as Microsoft Teams. Once Azure AD is configured to sync with on-premises, the identity for Microsoft Teams is then able to use these identities to dole out licenses to those identities, granting them access to the Teams features, such as Exchange mailboxes and phone system licensing.

Teams uses identities used in Azure AD. Groups can be created utilizing these Azure identities and from a governance perspective, different groups can be given access to different features of Microsoft Teams that fit in line with the function of the users within the group.

Structuring these groups properly can create a group-to-Teams relationship, but in a lot of cases, this will not happen. But we want to get to a point where we don't have to do a lot of clean-up work within our Azure AD, so the closer you can relate groups to Teams, the better. As you will see, we can set retention on groups and archive information within Microsoft Teams, so we could have many groups created that are not being used if we are not careful to unprovision these teams and groups consistently.

Admin roles in Microsoft Teams

There are several administration roles in Microsoft Teams. Depending on the administration role that you have, you can perform different tasks:

- **Teams service administrator:** This role has access to manage everything within the Microsoft Teams admin center. Along with managing the Teams service, it also can manage and create Microsoft 365 groups.
- **Teams communication administrator:** This role has access to manage all the calling features of Microsoft Teams, as well as the meetings feature within the service.
- **Teams communication support engineer:** This role is tasked with troubleshooting communications issues within Teams using the advanced troubleshooting tools available. This troubleshooting is done through the Microsoft Teams admin center.
- **Teams communication support specialist:** This role has access to troubleshoot communication issues using more basic tools. The scope of the troubleshooting tools and information available for the Teams communication support specialists is the individual affected user, unlike the Teams communication support engineer who has access to view data from all of the Teams communication users.
- **Teams device administrator:** This role manager is actually a device that utilizes the Teams service.

The following is the Microsoft 365 role that is relevant to Teams:

- **Global administrator:** Has broad access to administer the entire Microsoft 365 suite, including Microsoft Teams

Setting up these high-level administrator identities for support of the product is key to supporting Microsoft Teams. Make sure to remember to look at those areas specifically as you get started working with Microsoft Teams to make the right decisions on who has what admin access.

To learn more about Microsoft Teams administration, please follow this link to try your hand at administration:

<https://docs.microsoft.com/en-us/microsoftteams/manage-teams-in-modern-portal>

User roles within Microsoft Teams

There are two roles that a user can have within Microsoft Teams. A user can be a team owner or a team member. By default, the user who creates the team is given the role of team owner, and a user who joins the team is given the role of team user. All users are given the permissions to create teams by default; this is the recommended setting for Microsoft Teams – however, if this does not fit your in-organization strategy, then the default permissions can be modified to limit who is able to create teams.

As a global administrator, groups can be created in the Microsoft 365 admin console. Groups can also be created within specific applications such as Microsoft Teams. It is important to keep in mind that groups created in the Microsoft 365 admin console are available for use across the Microsoft suite of applications; however, if a group is created natively in the Microsoft Teams application, it is only available for use within Microsoft Teams.

Within the user roles, there are three sets of permissions that can be granted: owner, member, and guest. The owner is the person that creates the team, a member is someone that has joined the team within the organization, and the guest role is typically reserved for those who are outside of the organization, such as vendors or consultants, that the owner invites to join the team:

- **Team owner:** The team owner is the person that created the team.
- **Team member:** A team member is anyone inside of an organization that is invited by the team owner to join.
- **Guest:** Anyone outside of the organization that the team owner invites to join the team. This option may or may not be allowed within an organization and can be suppressed.

The following chart represents the tasks that Teams users can perform based on their role in a particular team. Organizations may limit the out-of-the-box capabilities of each role depending on governance specifications. Please consider whether any limitations are required before deployment:

Tasks allowed to perform	Owner	Member	Guest
Create a team	Yes	No	No
Delete a team	Yes	No	No
Converse in a private chat	Yes	Yes	Yes
Join in conversation	Yes	Yes	Yes
Receive an invitation on any Office 365 Account	No	No	Yes
Create a channel	Yes	Yes	Yes
Delete a channel	Yes	No	No
Create a private channel	Yes	No	No
Add team guests	Yes	No	No
Add a member	Yes	No	No
Change graphics on a team	Yes	No	No
Allow or suppress channel @ mentions	Yes	No	No
Edit private channel name	No	No	No
Configure team permissions on channels, tabs, and connectors	Yes	No	No
Edit team name and description	Yes	No	No
Remove user access from the team	Yes	No	No
Archive a team	Yes	No	No
Restore a team	Yes	No	No
Share a file from the channel	Yes	Yes	Yes
Add an App	Yes	Yes	Yes

Figure 11.2 – Teams tasks by role

Note

Team admins can control what guests within the team can do. Team owners can control some of what members and guests can do if certain functionality is not limited by team admins.

For more information on Microsoft Teams guest access, check out the following link:

<https://docs.microsoft.com/en-us/MicrosoftTeams/guest-access>

Teams and channels within Microsoft Teams

Teams and channels are created within Microsoft Teams. A team is defined as a group of people/content organized around a particular project within an organization. A team can be public, private, or organization-wide. I will discuss a bit more about these options in the *Creating a team* section. The purpose of a team is to bring people together to work closely on a common goal, task, or project; product launches; or ongoing organizational activities. They can be set up to reflect the structure of your company; for instance, each division or department can have its own main team's space.

Channels are segmentations within the team that are dedicated to a specific project, topic, or action. Multiple channels can exist within one team space. Chat conversations, documents, and other files within a team's channels are only accessible to members of the team. Channels can be extended with apps, bots, and connectors, including BI connectors, in Teams.

As mentioned earlier in this chapter, each team within Microsoft Teams corresponds to a SharePoint Online site and each channel within a team corresponds to a folder within that site.

Deployment

Microsoft recommends deploying Teams in stages and not rolling out all the Teams features at once. We wholeheartedly agree and can speak from experience here as we participated in a very rapid rollout of Teams due to the pandemic. The vast number of features and lack of organizational communication (we will go into the need for a firm communication plan in the next section) left users befuddled and overwhelmed and hindered adoption due to confusion about what in fact Microsoft Teams is and what it does. As in all other rollouts, migrations, and upgrades, clear communication and training is key to satisfaction and adoption.

If you can deploy Teams in stages, pick the set of features you want to roll out first. If you already have other technologies that are performing these functions, you can drive adoption by letting the user community know that the older technologies will be phased out and suggest that they begin their transition as soon as possible to Teams for the features that will be replaced. For instance, if you are set to begin your Teams rollout with the chat and meeting features, which is recommended if you plan on making Teams the organization standard for these features, let the user community know when their previous chat and meeting technology, such as Skype or Webex, will no longer be accessible to them.

Training is also an immensely important step in your rollout. Training is made much easier when you focus it on a small set of features that are newly available versus expecting the user community to take Teams training on all the features that are rolled out at once.

Network considerations

Microsoft Teams has many features, including document collaboration, Skype phone services, chat messaging, virtual meetings, and more; each of these components requires network and bandwidth considerations. We will not do a deep dive on network preparation for Microsoft Teams in this book; however, there are some requirements that you must consider:

- Make sure that your organization's network is already optimized for Microsoft 365. If it is not, you must follow the prerequisite steps from Microsoft's site to make sure to prepare the network for this optimization.
- At a minimum, all locations where we use Microsoft Teams must have internet access, of course. For all locations that will access Teams, the following ports must be opened, and the IP must be set:

Ports: UDP ports 3478 through 3481

IP addresses: 13.107.64.0/18, 52.112.0.0/14, and 52.120.0.0/14

- SharePoint Online and Exchange Online must be deployed within your organization.
- Once Microsoft Teams is deployed, please test the following for network optimization as further optimization may be required:
 1. Check whether Teams is running slowly.
 2. Check whether meetings are connecting slowly.

3. Check whether documents are opening at a sufficient rate.
4. Check whether call audio is clear or whether calls are dropped.
 - Utilize the call quality dashboard to understand the quality of calls and meetings within Teams. This will help to identify issues and plan remediation.

To access Microsoft Network Planner, please visit this link: <https://docs.microsoft.com/en-us/microsoftteams/prepare-network>.

Communication

Having a firm communication plan is extremely important to the success of your Microsoft Teams deployment. If you have chosen to roll out only certain features, make sure that this is highlighted in the communication plan and the communications being sent to users. The user community will undoubtedly begin doing research on their own on the features of Microsoft Teams and may be confused as to why certain features are lacking in the initial rollout.

Along with the communication, if there is a long-term strategy within the organization to use Teams as their preferred method of collaboration and communication, make sure this is emphasized in the plan. This emphasis can help drive adoption as users are often hesitant to move to newer technologies when their older counterparts are still in use within the organization. Let the user community know that the older technologies will be phased out.

Also, within your communication, reference or link any training sessions that are available to the user base. I believe it is important to have live overviews and step-by-step training sessions from the beginning. These live sessions are important especially if you are doing a phased rollout or rolling out to a smaller user base at the beginning because it will allow you to gather many of the questions that users may have and ascertain any confusion that the subset of users may have concerning Microsoft Teams. Gathering this information at the beginning will allow you to tailor your environment, communication, and training going forward.

Prerequisite steps

Before you embark on a Microsoft Teams rollout, there are a few steps you need to take to make sure you look at all your environmental dependencies. As we talked about governance over SharePoint, we also need to do the same for Microsoft Teams and this should be taken even more seriously as it really opens huge areas of concern and exposure to unwanted incidents.

When looking at these prerequisite steps, we are really going back to our section on governance. Here, though, we will explain more about the high-level governance needed to be in place to make sure the service is covered and vetted by all stakeholders.

The areas that we want to concentrate on are the following:

- Project stakeholders
- Project scope
- Coexistence and interoperability
- Journey to be successful

There are many things that need to be done as well to get started, such as workloads, configured domain, Azure AD, Exchange configuration, Microsoft 365 groups interaction, and other areas, which include a public switched telephone network if this is the configuration you are implementing. Please make sure to look at this link before you start your journey:

<https://docs.microsoft.com/en-us/microsoftteams/upgrade-plan-journey-prerequisites>

Using Microsoft Teams

Once Microsoft Teams is deployed within your organization, you will need to log in to the Microsoft Teams environment to use the application. Within most organizations, this access will be the same as what is used to log in to your computer and other applications both on-premises and in the cloud, which is a single sign-on. If Microsoft Teams is not yet configured within your organization and you would like to get a preview, Microsoft is currently (at the time of writing this book) offering a 30-day free trial. You will need to sign up for the Microsoft 365 Business version to have access to SharePoint.

In this section, we will go over some of the basic instructions for using Microsoft Teams. You will learn how to create your own team and create a channel within your team. You will also see how to start a conversation within a document to showcase this cool social feature. We will also briefly discuss a bit about tabs, which can be added to channels within the team workspace. This book is by no means an exhaustive resource for Microsoft Teams; however, we will highlight some of the features that you can explore in more depth on your own.

When opening Microsoft Teams, you will see the following sign-on page come up on your computer. The same page renders on your mobile app if using the app on a mobile device:

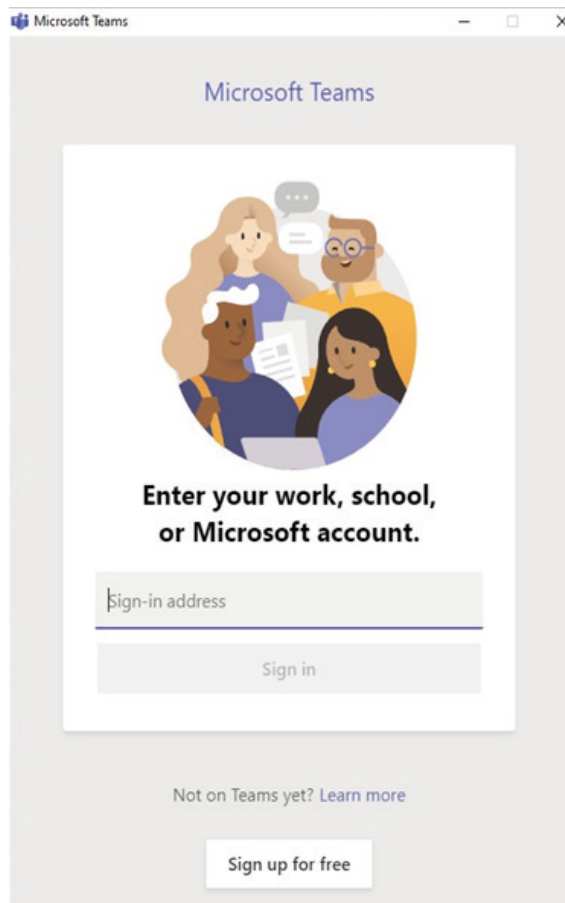


Figure 11.3 – Microsoft Teams login

Once you are successfully logged in to Microsoft Teams, you will see your Teams workspace as shown in *Figure 11.4*. From this location, you can view, create, upload, and edit documents, make phone calls via Skype, start a Teams meeting, or engage in or start a new conversation. You can also create a new team, a channel within a team, and much more:

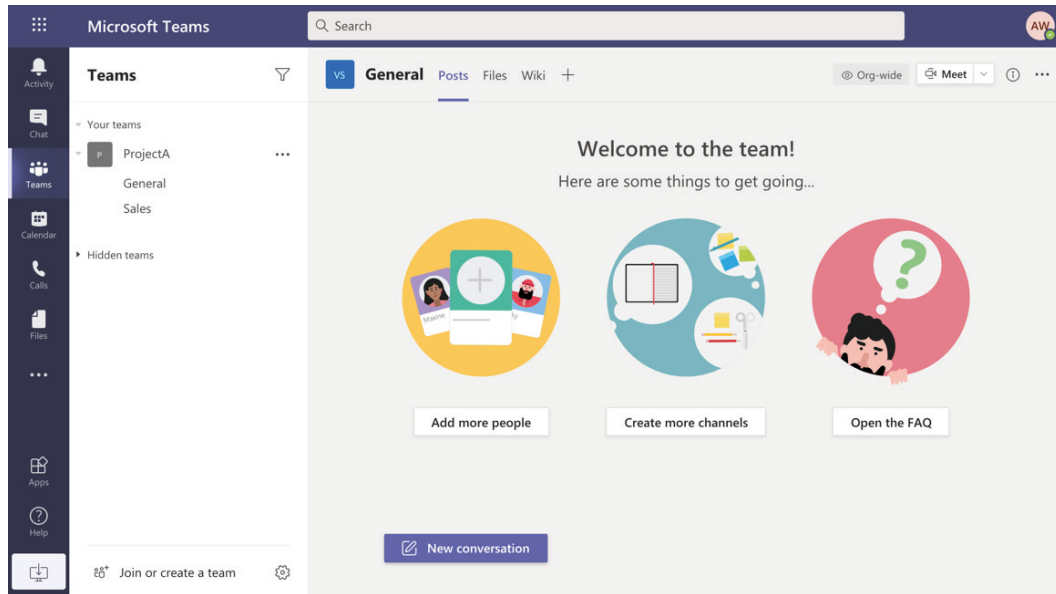


Figure 11.4 – Microsoft Teams home page

- **Teams:** The Teams workspace is the location where you will be able to create more teams, which Microsoft defines as the groups of people that you will collaborate with on projects and assignments.
- **Channels:** Channels help organize your Teams content into specific topics, departments, or projects.
- **Conversations:** Conversations are the chat feature within Teams, which can also take place within a channel. All conversation content, including meetings, is open to the whole team that has access.
- **Meetings:** From the meetings icon, you can start a meeting immediately with your team members or schedule one for another time.
- **Files:** The files feature of Microsoft Teams allows you to manage documents and collaborate on documents within the Teams interface. As you will see, the features within the files location are similar to what you would see on a SharePoint site.

Creating a team

When Microsoft Teams is rolled out within an organization, users will have access to any organizational teams spaces that they are automatically added to by being part of the enterprise organization AD group that is synced to Azure AD. However, there is also an option to create your own group within Microsoft Teams to collaborate with a specific community of users within the organization. Follow these steps to create a new team:

1. Log in to Teams.
2. In the bottom-left corner, click **Join or create a team**:

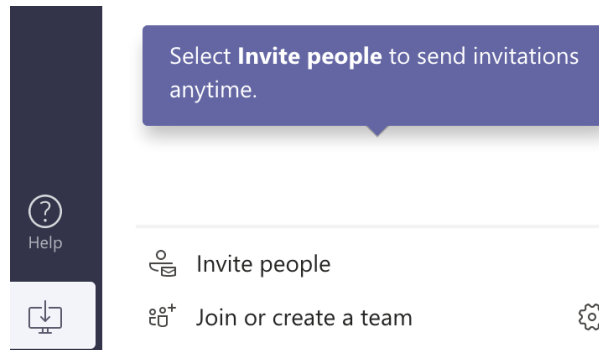


Figure 11.5 – Invite people and send invitations

3. Click **Create team**:

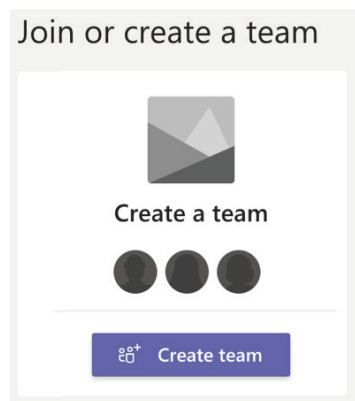


Figure 11.6 – Link to create a team

For this example, I will create a team from a template. Select **Manage a Project**:

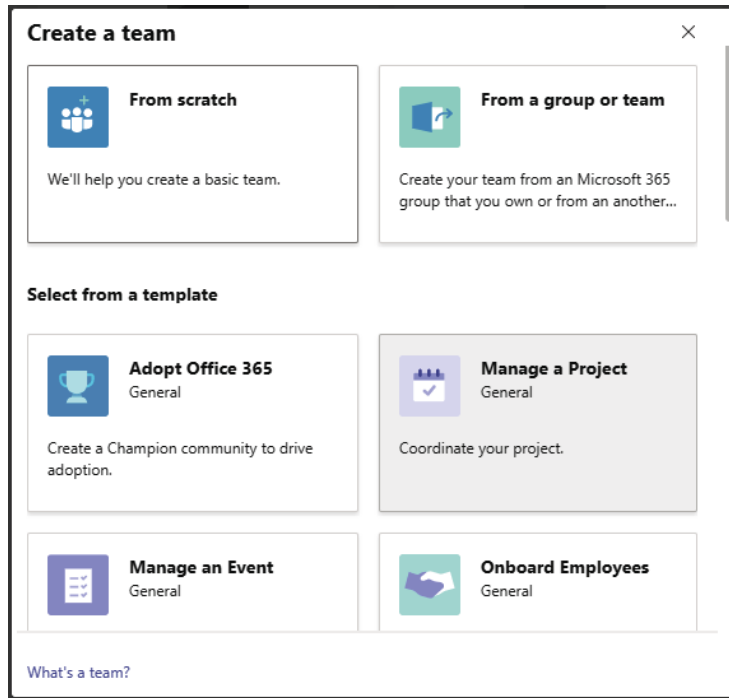


Figure 11.7 – Templates for team creation

- Here, we see three different settings to determine what type of team you want to create:

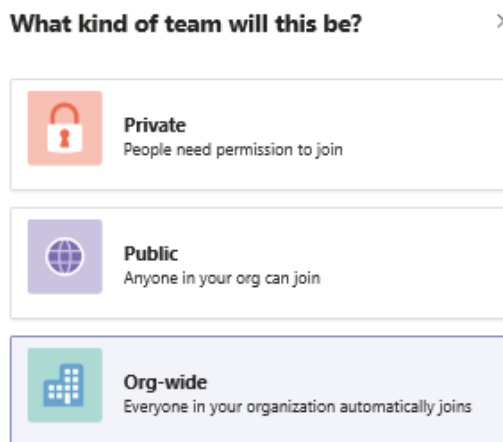


Figure 11.8 – Select the type of team to create

- **Private:** You will want to choose the **Private** option if you want to keep this group to a limited audience. With this option, only those with permission to join will be able to access this team and the content native to it.
- **Public:** The **Public** group option allows anyone in the organization to join this group.
- **Org-wide:** The **Org-wide** option automatically gives everyone within the organization access to this group.

A note on creating an org-wide group. Org-wide teams can only be created by the global administrator. This type of team is synchronized with the organization's AD and is kept up to date as people join and leave the organization. Microsoft imposes limitations on this option; only organizations with less than 5,000 users can create an org-wide team and the number of this specific type of team is limited to five per tenant.

5. Name your new team:

Some quick details about your org-wide team ×

Team name

Required

Give your team a name !

Description

Check here for organization announcements and important info.

< Back Create

Figure 11.9 – Name your team

6. Your team is now created:

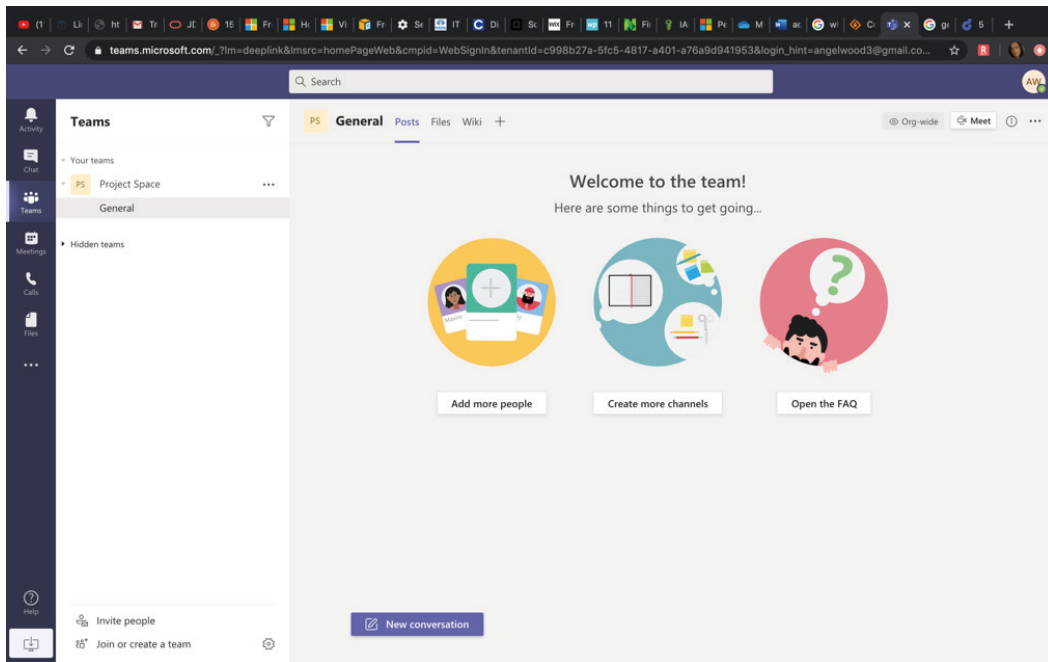


Figure 11.10 – New team home page created

Now that you have added your team, let's create a channel to continue to show you the structure of how Microsoft Teams works.

Creating a channel in Microsoft Teams

The following instructions show you how to create a regular channel and a private channel within your team. Remember, it is best to think of the logical architecture of your team and channels so that the purpose of the workspace makes sense to your users. Let's look at the steps:

1. Navigate to the Microsoft Teams site or desktop app and sign in:

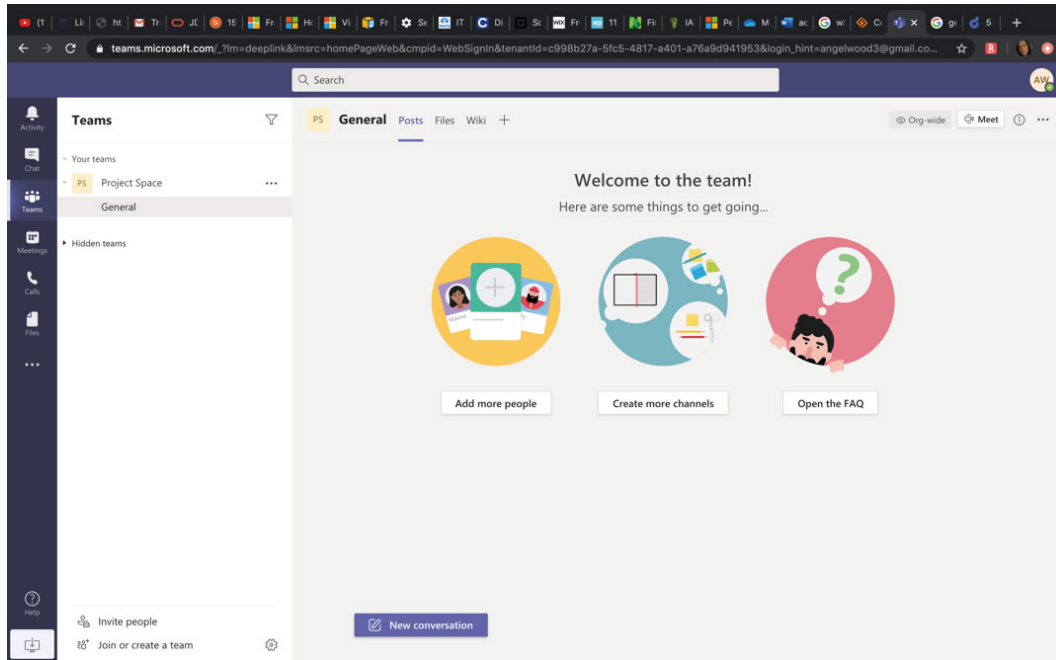


Figure 11.11 – Microsoft Teams home page

2. Select the ellipses (...) to see the list of more options, then select **Add channel**:

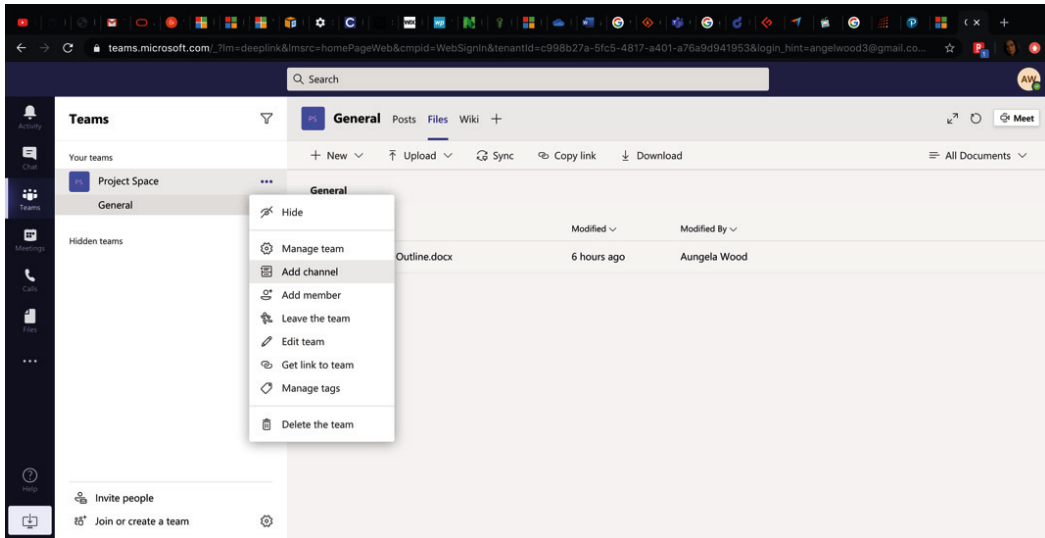


Figure 11.12 – Add a channel from the menu

3. Select a name for your channel, then click the **Add** button:

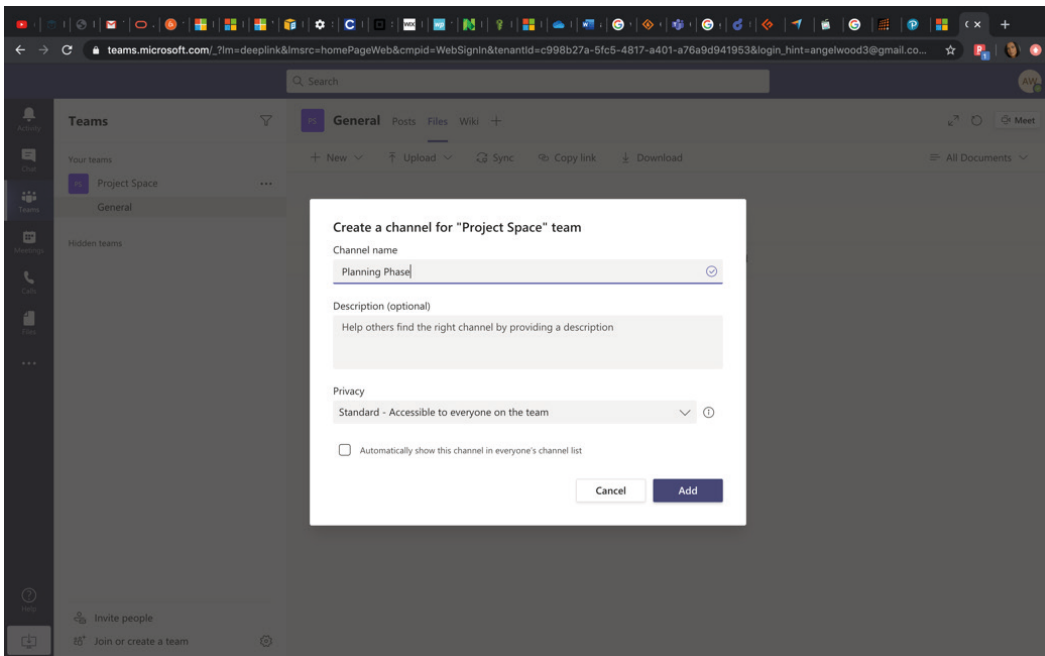


Figure 11.13 – Name the channel

4. Check on the left side of your workspace and you will see the newly created channel:

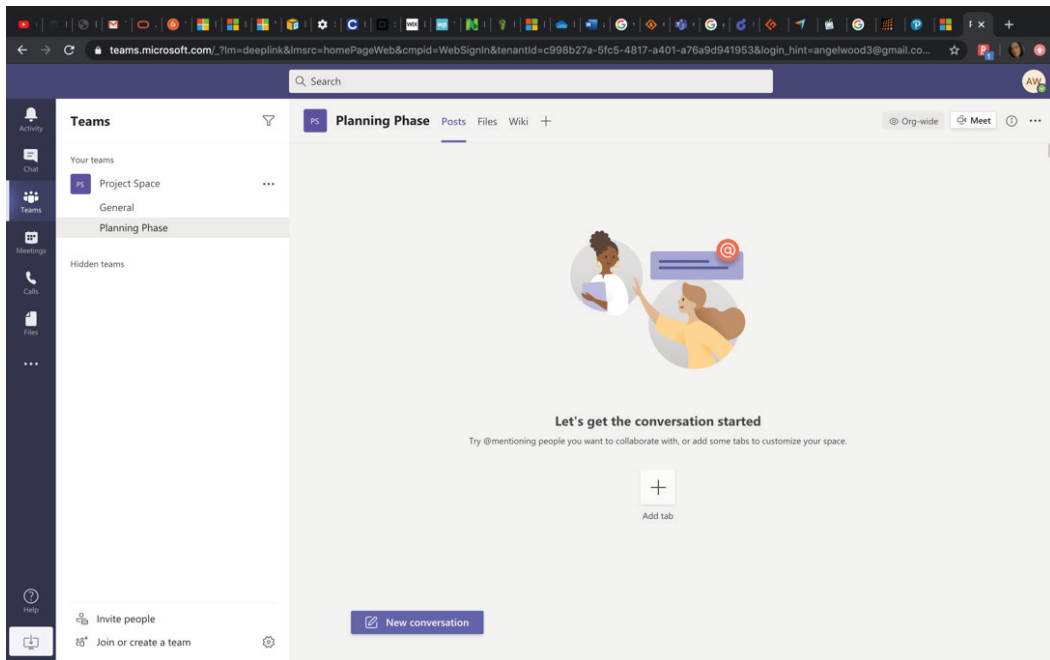


Figure 11.14 – Channel home page

5. The channels within Teams are very extendable using apps, bots, and custom connections. If you click the **Add tab** button, you will get a list of the many tab options that you can add, by default:

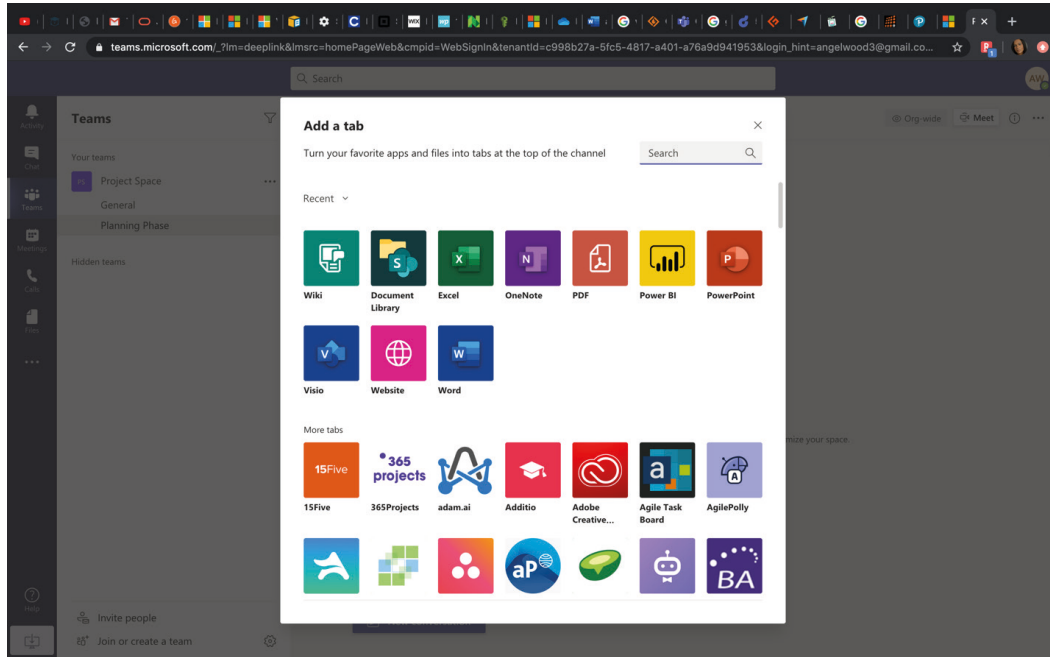


Figure 11.15 – App integration tab

Many of the tabs, including Power BI, must be configured in your Microsoft 365 environment to be utilized as a tab here. You can also limit what apps are seen here by securing this area using the Microsoft Teams administration settings.

These apps come in handy when you want to create a connection to information in another app or even use Power Apps to create a survey for the team to collect information. You can use many forms of storage for the information gathered, such as Excel spreadsheets, SQL databases, and more. It is a very cool tool to help share information within Microsoft Teams!

Opening a document in SharePoint

Let's look at the steps for how we can open a document in SharePoint:

- 1. Navigate to the document that you want to open in SharePoint.
- 2. Click the ellipses (...) and select **Open in SharePoint**:

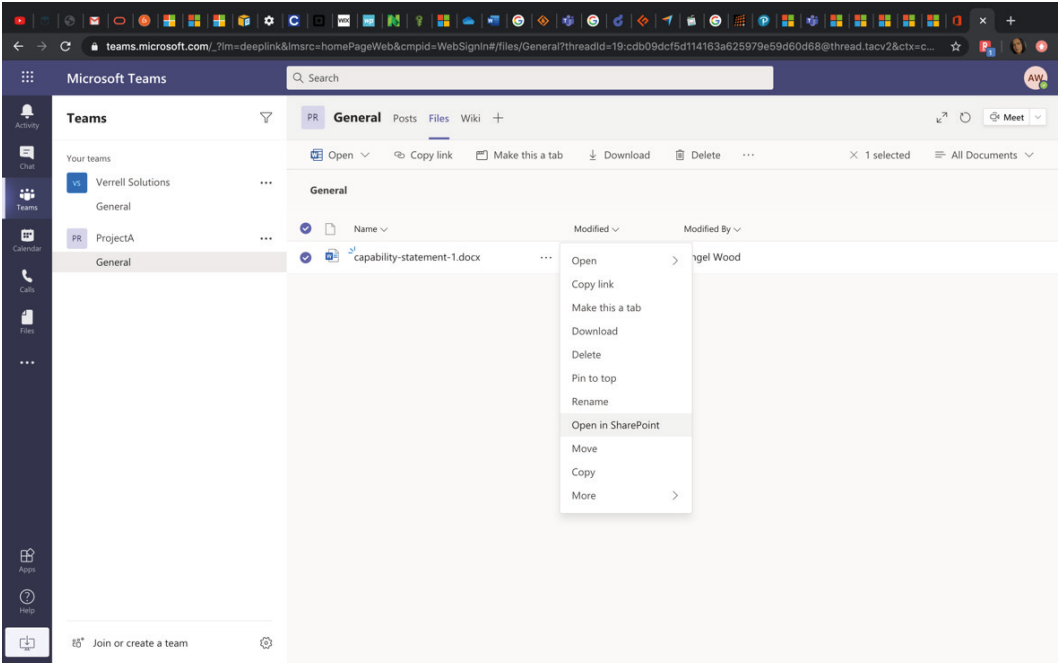


Figure 11.16 – View of SharePoint list within Microsoft Teams

3. You will now see the SharePoint Online library behind Microsoft Teams:

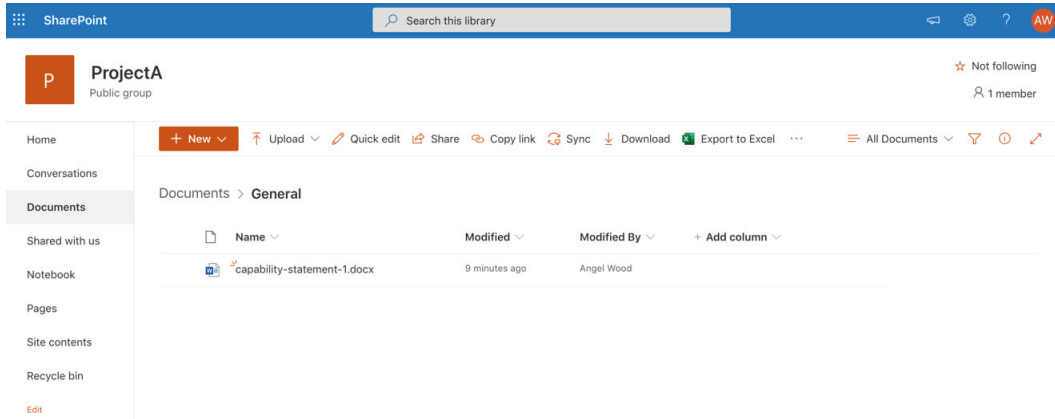


Figure 11.17 – SharePoint list view in Microsoft Teams

Utilizing the **Open in SharePoint** option, you can view the SharePoint document directly from the SharePoint site; however, opening this document in Microsoft Teams offers an extra feature not available in SharePoint Online alone. This is the conversation feature that we mentioned earlier. This is one of the most useful features of Microsoft Teams when it comes to document collaboration in real time. Next, we will go through the steps of starting a conversation within a document in Microsoft Teams.

Starting a conversation within a document

Follow the steps given for creating a new conversation:

1. Navigate to the document that you want to open in Teams:

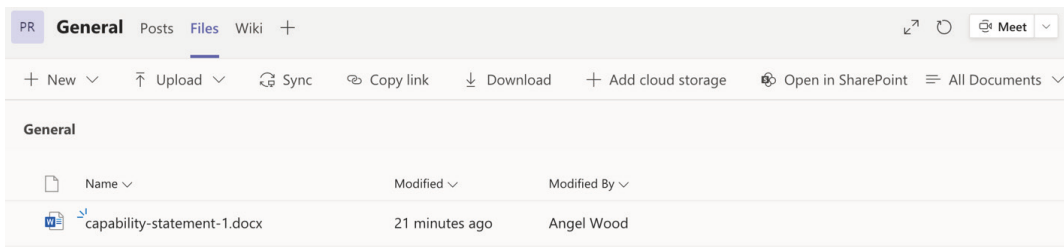


Figure 11.18 – View of a file in Microsoft Teams

2. Click the **Conversation** button at the top of the page:

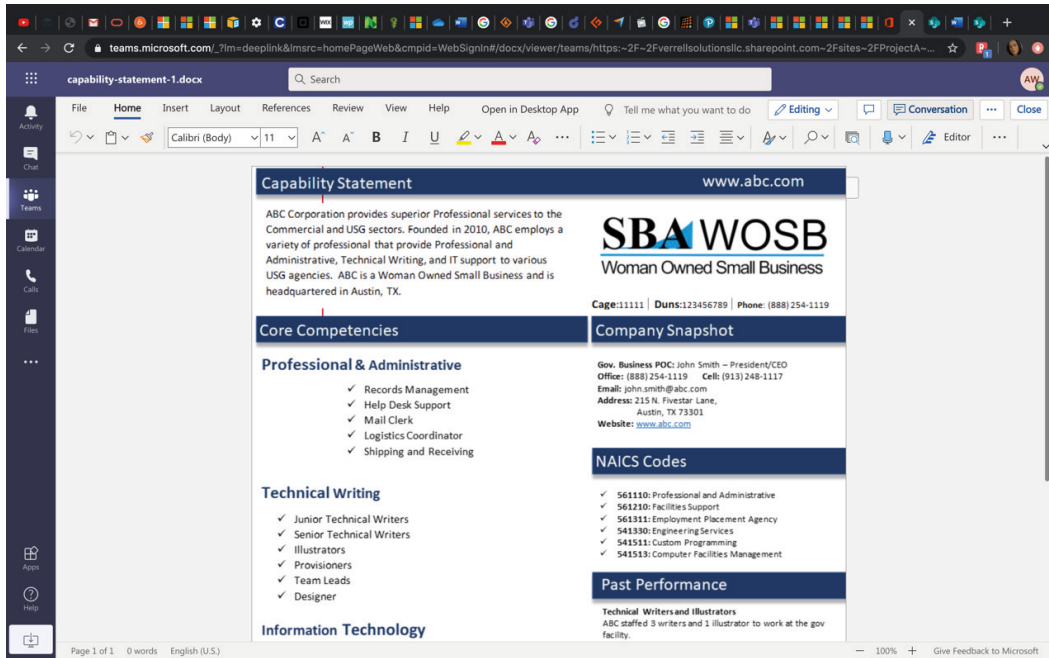


Figure 11.19 – File open in Microsoft Teams

3. The conversation pane will be displayed on the right side of the screen. Type your message in the chat window at the bottom of the pane and click **Send**:

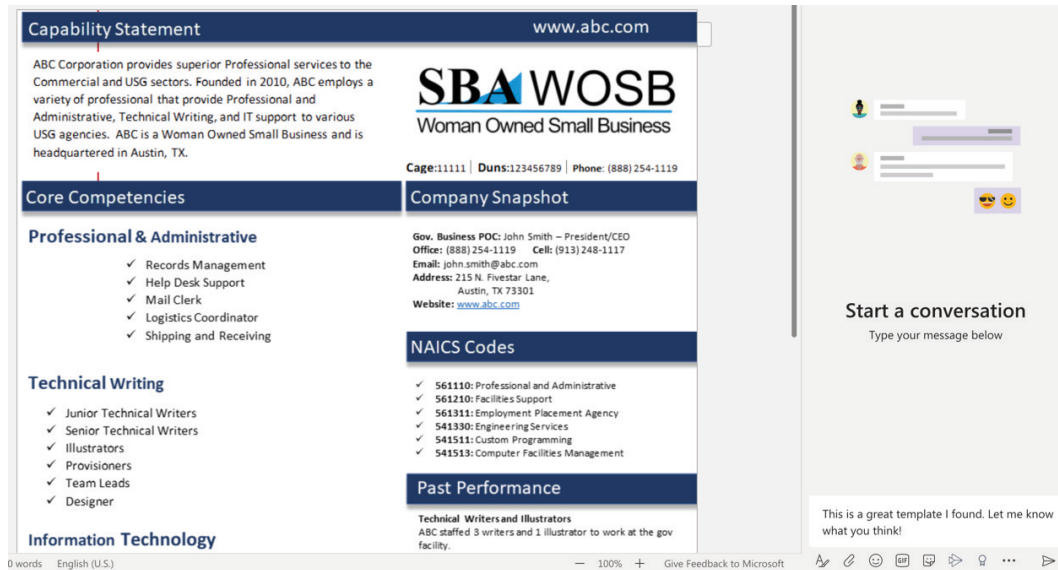


Figure 11.20 – Start a conversation on the file with others in your team

4. See your message displayed in the pane:

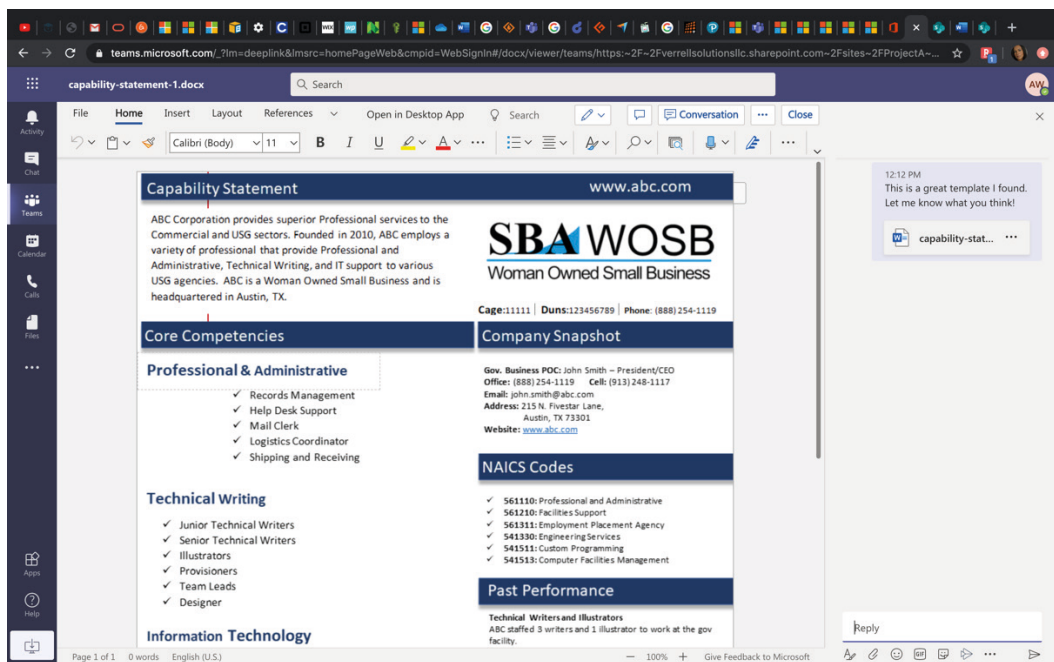


Figure 11.21 – Click send to send a message to a team member

5. Anyone who is a member of your team has access to view the document and the conversations related to the document. If a team member misses the real-time conversation on the document, they will receive a notification with the document linked and the conversation displayed:

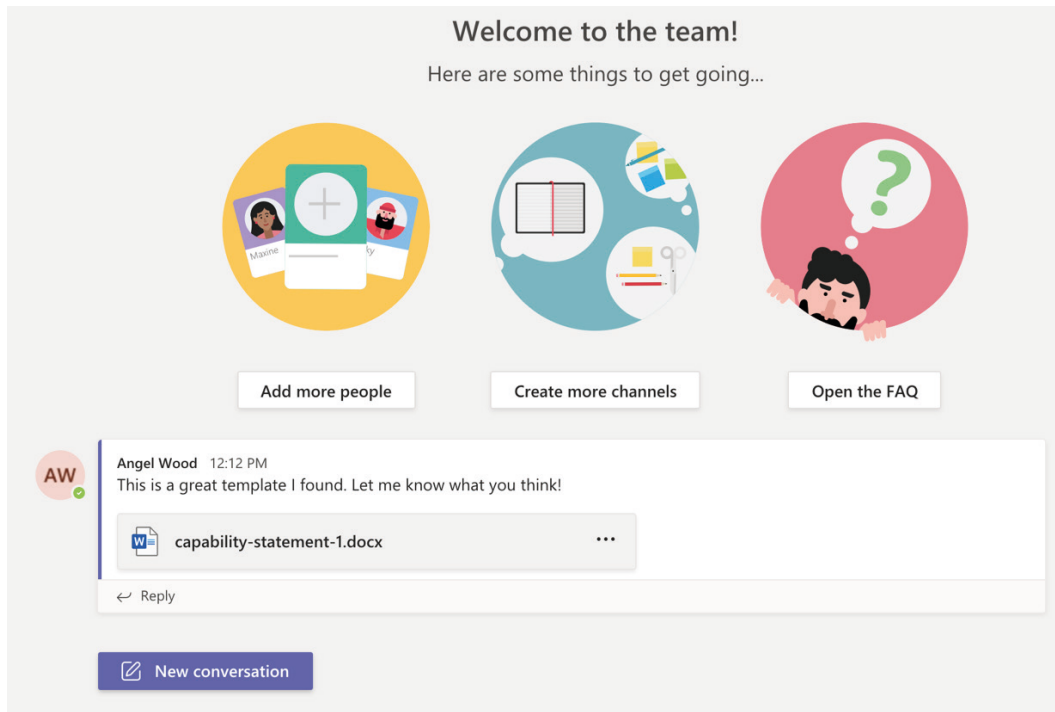


Figure 11.22 – Welcome page for a newbie team member

Adding a SharePoint-related tab to a Teams channel

There are a few ways to integrate content from SharePoint into a tab in your Teams channel. As mentioned, tabs are a way to extend the functionality of a Microsoft Teams workspace. There are various apps that can be added to a tab within your Teams channel. Some of these are out of the box; however, Teams allows customized apps to be added as well. Of course, these apps must be deployed and allowed within your organization's 365 instance. Teams allows you to add a SharePoint page from the SharePoint Online environment behind your Teams workspace. You can also link to SharePoint, page lists, and libraries via URL.

To add a tab in a Teams channel, use the following instructions:

1. Navigate to the channel where you want to add a tab:

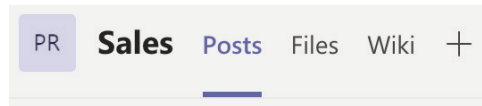


Figure 11.23 – Teams menu

2. View the list of available options:

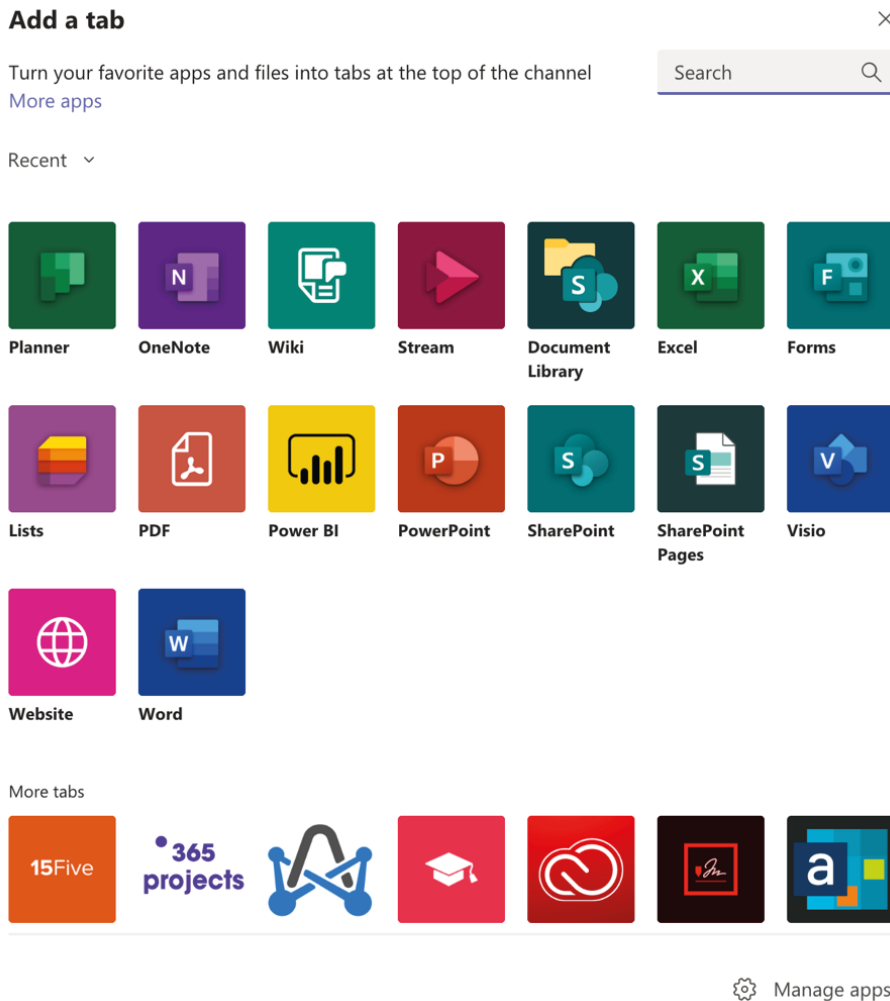


Figure 11.24 – Use apps within Microsoft Teams using tabs

You can see on the **Add a tab** page that there are several default apps that can be added to your Teams channel. Some of these are the standard Microsoft applications, such as **Word**, **PowerPoint**, **OneNote**, and **Excel**. However, do take special note of the **Power BI** app, which can be added as a tab, as well as the SharePoint **Document Library** app. There is a **SharePoint Pages** app that will allow you to add a SharePoint page from your SharePoint Online environment that is associated with this team's site. You can also select the **SharePoint** app, which gives you a bit more flexibility in connecting to content outside of the site that simply exists within your Teams channel. In addition to the out-of-the-box apps that are displayed, there is also the option for a developer to create custom applications within your organization, and based on access, those applications will be displayed here as well and can be chosen as a tab.

Best practices for organizing Teams

There are some best practices to consider when organizing a team within Microsoft Teams. Please keep in mind, regarding documents, that these are stored in SharePoint, and that behind every team created in Microsoft Teams is a SharePoint site, and every channel is a document library. There are limitations and restrictions imposed by Microsoft that must be considered. These limitations can be seen in the following chart – you will see that they are very high and, in most organizations, users will be just fine with not breaching these limitations. However, without firm governance and data cleanup, over time these limitations could be breached and cause issues.

If users are arbitrarily creating teams in channels within teams and these are not being used, this could cause the organization to approach these limits rather quickly. If there is a large organization with a lot of users with the ability to create teams, you can imagine how issues can arise over time. Think about how this has been an issue historically in SharePoint and it's still an issue that users have been known to create sites when a library or list would do or creating sites that are abandoned. Users must be aware of this possibility and the best practice of limiting the number of teams and channels created to only those that are purposeful within the organization should be driven home.

The option to allow team owners to create teams and channels can be restricted, although this is not recommended because this can affect the business purpose for which the organization wants to utilize Teams. This is where great communication and training will come into play; team owners must understand their responsibility in maintaining the logistical and purposeful use of Microsoft Teams. This can be likened to, within SharePoint, making sure that your site admins are knowledgeable and maintain their sites and prevent unnecessary sprawl.

Out of the box, team owners can create private channels at will. What administrators must understand is that private channels are their own SharePoint site collections and should be limited in number. You do not want team owners creating a lot of private channels that correlate to SharePoint site collections. The team administrator can limit the ability of team owners to create private channels; this option should be considered. Each team can have up to 100 team owners; if they are all creating private channels, this will become a problem.

Each team and each channel within a team should be created for a purpose, a goal, or a project, and only those that are necessary to contribute to that purpose should be added to that team. Channels and apps and connections within channels should be added solely for the purpose of reaching the goal of that team.

Limits and restriction considerations

There are some limits and restrictions that Microsoft has placed on teams and channels and we have included this information in the following chart. Please check Microsoft's site for updates as these limits can change:

Features	Limits
Number of teams per user	250
Number of team memberships per user	1,000
Maximum members per team	10,000
Owners per team	100
Org-wide teams per Tenant	5
Members in an Org-wide team	5000
Teams created per Global Admin	500,000
Maximum number of teams per organization	500,000
Number of channels per team	200 (includes deleted channels until 30+days)
Maximum members in Private channel	250
Members in Office 365 group that can be converted to a team	10,000
Channel conversation post size limit	28KB in total

Figure 11.25 – Best practices and limitations of Microsoft Teams

Now that we have looked at some of the functional areas of Microsoft Teams, let's take a look at one of the meeting features within Teams called live meetings.

Configuring an auditorium solution with Microsoft Teams

When taking advantage of Microsoft Teams as your go-to meeting application, you can do so much more with this application as it also makes sense to have live events using the application as well. As we noticed while working with the platform, it is open to governance and configuration settings to manage a host of functionalities. The focus of this section will be live events using Microsoft Teams to manage, host, and collaborate during the event.

The configuration I put together that I have implemented is for a company that recently really loved Microsoft Teams. They wanted to use Teams in an auditorium setting and wanted to host their meetings at their location, but they did not leave out those who wanted to either stream the event or call into the event. Some requirements that were stated were there was a band playing during the event and some guest speakers as well. The company also wanted video to be displayed on each side of the stage along with three cameras, one wired and two wireless. These would be used to catch separate angles from the event so that the video producer could pan back and forth between the video cameras.

Unfortunately, I am not going to be able to go through all the technical information in this section, but this will get you started at a high level on the journey to hosting live Teams events. My background in music played a big part in setting this up for the companies I configured this for and we will keep this simple so that you get an idea of what to buy, some small details, and how to set up a live event.

Our event will look like this once we set up all the hardware components:

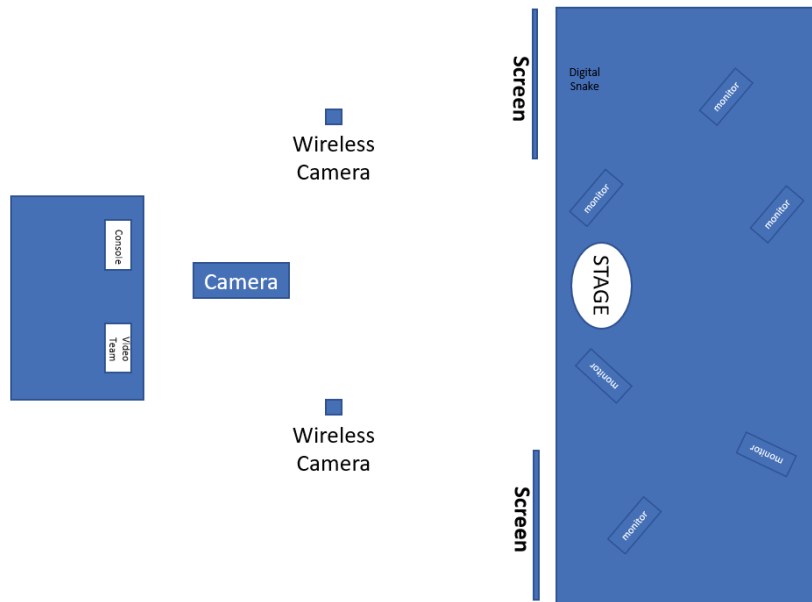


Figure 11.26 – Auditorium setup

The components used in this diagram to make up the solution are the following:

- Behringer X32 mixing console
- Two laptops for the video team
- One HDMI video camera
- Two wireless video cameras
- Two 70-inch monitors
- Six stage monitors
- Two main speakers
- Other microphones and Cat 6, HDMI, and USB cables not shown

Since this is basically a small concert setting, we are going to start with the Behringer X32 console as the first area of focus. The Behringer X32 is an intermediate digital sound console as far as cost and notoriety around the music world go. It's not bad for the price and will give you a great sound with some amazing features to go along with it since the board is digital. The mixer supports many new functions you will not see in analog mixers:



Figure 11.27 – Behringer X32 mixer

Some of the first things you will notice are that the console is large and needs some room to manage the cabling and for someone to manage the mixing. The main things you want to find in a mixer are how many channels it provides because this will play into how many instruments or vocal mics can be provided to the band or hosts while they are doing the event. If you plan on having music, there are AUX inputs that can be used for those connections but make sure to get the right type of cabling to support your source. The mixer comes with a small window console to manage settings and is fairly easy to use, and you will get a manual that is in PDF form and comes in paperback.

This mixer also comes with a network connection for Cat 5 that enables it to be managed on the network from a remote console such as an iPad. Mixing the sound on an iPad can be very useful when there is no one to manage the sound, or the sound person can also be home mixing as well. This is almost the best way to do the mix and that is due to you wanting to check the way the sound is coming out through the speakers at home because this is what your audience will hear when the event is streaming. They will not hear what you hear in the auditorium, so we must do some things outside the auditorium to make sure things are mixed well.

There is also a USB connection that takes the sound input and pushes that sound out digitally to a laptop. In most cases, all mixers will need to have a driver installed on the laptop to make sure it can connect the hardware to the computer. Once you have that driver, you will see the choice for sound sources that comes up in the Microsoft Teams device settings menu for the X32 sound source, which then will project that sound through your Teams event.

The sound needs to be mixed well and you want to make sure you verify that the mix you have created, called a scene, works for the outputs in the auditorium and for those streaming online. Using two separate scenes in the console will provide that capability and give you a way to change settings on the different mixes separately as needed.

This also brings up some other X32 capabilities, for example, you can set mixes for different outputs in the mixer. So, if you have a house mix, which could be the main mix on outputs 1 and 2, this can be set in the mixer and saved as a scene as well. So, when you select that scene or channel configuration, the mix comes back to the board, where you can change it and then save it again if needed. If you have a mix for the USB out and the sound is just not working or you added an instrument, you can also go back and edit the channels you have saved to be received by that output. Overall, the board gives you so much control over everything, but if you come from an analog background like me, then these new mixers will take some getting used to.

If you are having trouble with your X32 console, look at updating the firmware. Old firmware could cause freezes on the board and other weird power issues where the board resets power with no warning. Upgrading the firmware will provide the latest and greatest menus and functionality for the board as well. It will also fix a lot of hardware issues you may have. We suggest doing this as soon as you get your board, so you program your settings on a good foundation and download the compatible Windows drivers for that firmware as well. One thing to remember is that the board settings will be erased on this board once the firmware is upgraded. Save the scenes before you upgrade if you started adding scenes before you upgraded the firmware. You should upgrade the firmware no matter what soundboard you buy!

Headphone amps are also useful for stage sound instead of monitors and help the musicians and others who are part of the event to hear the music clearly and/or even a microphone you may deem as an instruction feed for stage coordinators could help in the production of the event as well. As a musician, I have used these many times and it helps to hear the music more clearly and even instructions from a bandleader. This requires a separate feed from the mixer, which would be from the analog or digital snake where instead of using an input, we would use an output to get the feedback to the headphone amp. Separate mixes can be sent, or you can use one mixer to feed all headphones.

The digital snake is such a lifesaver as far as cabling and getting a true digital sound from the players, singers, or MCs that will be performing at the event goes. The snake sends a signal from the digital input and output mixer on the stage with ¼ and XLR inputs and outputs back to the board so that the sounds from the instruments and vocals can be captured and mixed on the console. The snake costs a lot more than a traditional snake but provides a better quality of sound. This is really all it provides but avoiding having this huge cable from your console to your stage is also a saving as digital snakes can use Cat 5 or 6, depending on your mixing console, or a special cable. This also helps to feed the monitors on stage if needed so that everyone can hear themselves if a headphone amp is not the solution.

Wireless mics are what you see most of the time at events but there are still people that love cabled mics as well. The only thing to look at with wireless microphones is to make sure you either buy different brands of wireless mics or make sure to upgrade the firmware on the wireless microphones' bases. In most cases, the newest brands provide channel separation if there are the same brand wireless microphones on stage. If you do not have the latest and greatest, then updating the firmware may be your answer. It is important to make sure the microphones do not stay on the same channel because when they clash, you lose your sound from the microphone, which means the audience will not hear you and could miss something important you said.

Your video team should investigate what software will work with Microsoft Teams. In some cases, Teams is all you need. When doing a live event, the console changes from the normal Microsoft Teams screen where you see other people to the live interface, where you see a staging area and a live area for presenting the staged content. This is good in some cases but there is other software out there, such as Wirecast, UBS, and others, that give you better functionality to handle many types of feeds. Although Teams does handle some feeds well, some feeds are currently not handled very well. I tested many different types of HDMI adapters to see which one could help with the multiple cameras and figured out that Teams is still in need of some upgrades.

NDI was not available when I did this installation, but I believe it is soon to be available to use with Teams, which will make Teams more compatible with other video management software out there. NDI is a video network protocol that streams video from different network resources but can be captured by a software application so that it can be managed by the producer. It makes cameras that are wireless easy to connect to and brings those feeds back to the video console. You can also connect wireless cameras using IP as well by connecting them to the laptop and then pulling them into your software.

It also creates an environment where if we had a second laptop and had something we wanted to stream from that laptop, then we could use NDI to bring that video back to the main producer console. This is all wireless or you can use Cat 5/Cat 6 to connect all the hardware. With that being said, I still like the Cat 5 or 6 option because when a network protocol fails, it really makes troubleshooting tough, especially when you are live streaming. Knowing a cable could be the problem is a quick switch, so I have been up in the air so far on hardware connection. Network cables also provide reliable streaming, so you do not lose video stream during a production.

Cameras come in so many shapes, sizes, and tech varieties. The main camera used for this setup was an old Sony HVR-HD10000U camera that had HDMI and then I purchased two Mevo wireless cameras. The Sony camera was used as the main camera and was connected using HDMI. This camera did most of the main video captures for the event. It was manned by a cameraman and used to pan and follow the main person on stage. The wireless cameras were focused on other parts of the stage but with the Mevo, you can also do some remote control to zoom in and out. This became very effective for the shots during the event.

The Mevo is very unique as it will connect to your wireless network and make itself available for streaming. It can also be connected directly to some applications, such as Facebook, which it was built to be used with. The camera is small but gets some great video and you can buy a stand for it or mounting hardware to put this camera pretty much anywhere. It is not a high-end camera with a lot of tech bells and whistles but for the price, it is great, small, and compact:



Figure 11.28 – Mevo camera

All video monitors were installed using TV risers and were 70 inches to present a good view from the back of the auditorium. We connected them all through HDMI to a switch and then back to an HDMI switcher in the booth. To get the monitors connected, we used HDMI boosters that used Cat 6 to connect a TX and RX box on each end. Those then convert to HDMI on the other end of the hardware, which is then connected to the TVs. We ran our cables over 100 feet and the feed was solid with no delay or lack of clarity on the screen.

So, let's now look at how to create a live event.

Creating a live event

Follow these steps to create a live event:

1. To create a live meeting, use your calendar in Microsoft Teams to create a new event from the **New meeting** menu:

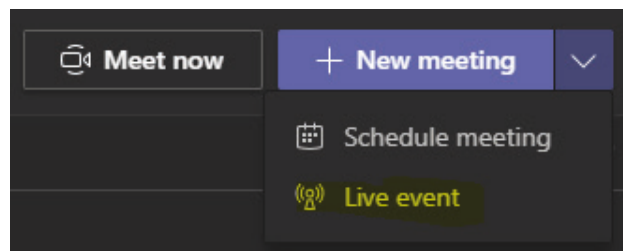


Figure 11.29 – Microsoft meeting creation menu

2. Select **Live event** from the menu. The menu for the live event will come up on your screen:

New live event

You are setting up a live event

To invite attendees, copy the link once you schedule the live event, and publish it or send it in a calendar invite. [Learn more](#)

Title *

Location

Start **End**

Oct 14, 2020 9:30 AM Oct 14, 2020 10:00 AM

Details

B *I* U

Provide info about the live event

Invite people to your event group

Invite presenters

Organizer

Lewin Wanzer
Producer

Close **Next**

Figure 11.30 – Create a live event screen

- Fill in the areas of information to give the event a name and provide start and end dates and times. If you have people you would like to invite now, say that are part of the production team or presenting, you can add them in the invite people area of the form.

4. After clicking **Next**, we will get a menu to choose permissions for the event:

The screenshot shows a dark-themed interface for setting up a new live event. At the top, it says 'New live event'. Below that is a section titled 'Live event permissions' with three options: 'People and groups' (with a group icon), 'Org-wide' (with a building icon and highlighted with a blue border), and 'Public' (with a globe icon). Each option has a brief description of who can watch. Below the permissions section is a section titled 'How will you produce your live event?' with a radio button selected for 'Teams'. Under 'Teams', there are two checked checkboxes: 'Recording available to producers and presenters' and 'Recording available to attendees' (which has a help icon). At the bottom are three buttons: 'Close', 'Back', and 'Schedule'.

New live event

Live event permissions

People and groups
Only the specified people and groups can watch the live event.

Org-wide
Everyone in your org can watch the live event. (Sign-in required)

Public
The live event will be open to anyone. Use when most of the attendees are outside your org. (No sign-in required)

How will you produce your live event?

☒ **Teams**
You plan to use Teams to share content from presenters' webcams and screens.

☒ **Recording available to producers and presenters**

☒ **Recording available to attendees** ⓘ

Close **Back** **Schedule**

Figure 11.31 – Event permissions and settings

5. When choosing people and groups, you are selecting specific people you want to join that are part of your organization. **Org-wide** is everyone in your organization and **Public** is a mixture of organization and external attendees.

For the event I was working with, we chose **Public** because this was being broadcast to anyone who wanted to attend. We had a sign-up sheet on our website and added those emails to a list so that we could email the link to them. I am sure there are other ways to collect this information, but we did not have time to get into those areas.

6. Once you click **Schedule**, you will see the event details screen. This screen shows you the link for the attendees and gives you options to copy it so that you can share it. You can also join the event or create a chat. You can cancel the meeting if you are having trouble or need to reschedule:

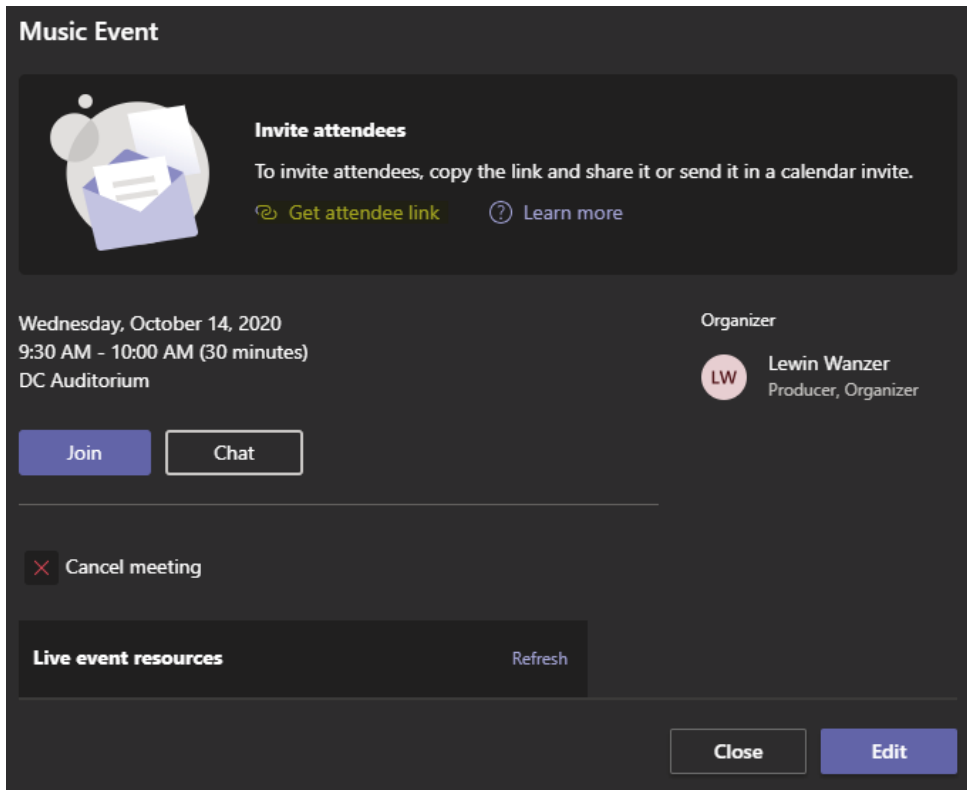


Figure 11.32 – Live event creation screen

7. The event is also placed on your calendar in Teams and Outlook:

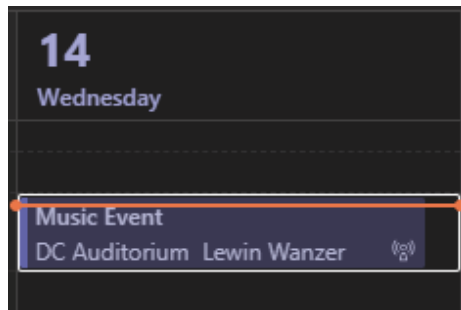


Figure 11.33 – Teams calendar view

The link for the event will automatically be sent to those you added as producers and presenters for the event. Their calendars will automatically be updated.

8. Once the event has started, as the producer, you will see the production screen:

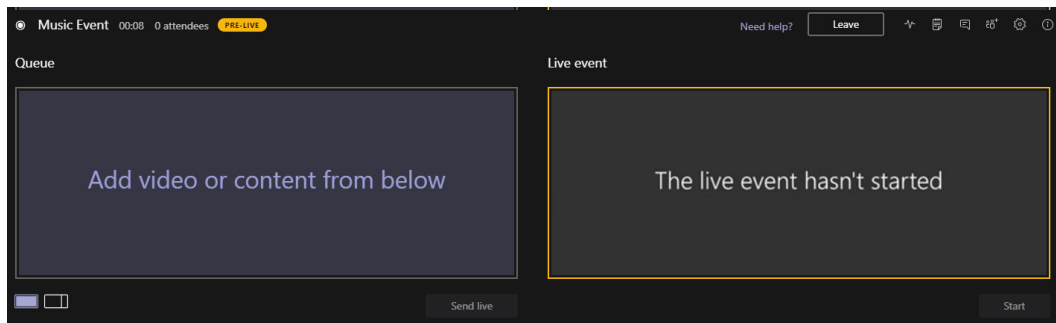


Figure 11.34 – Producer screen

9. You can see the **Queue** area, which is where we need to add a feed from our video camera or other apps to be shared live. This is how we prepare content to send live. This can be an app such as PowerPoint or any open app, video monitor, or HDMI feed. Once you have your content ready for presenting, you would click **Send live** and start the event.

10. If you need to display two content sources such as video and content from another app, Microsoft Teams give you an interface to do that within the live event UI:

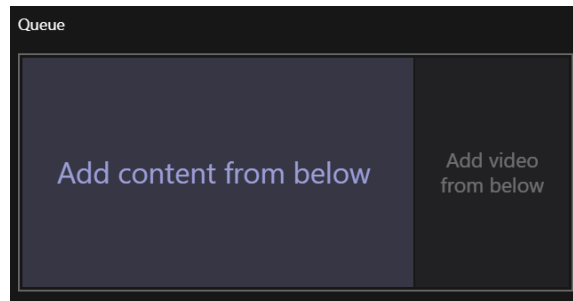


Figure 11.35 – Queuing content screen

11. We can see that there are a couple of queue interfaces we can use. One interface is to display just one content source, and the preceding screenshot shows how we can add video and other content in the same feed, which is very good to show variations of content on one screen. We are sure Microsoft will provide more variations with this UI in the future but there is also other software such as UBS that give you better options and more flexibility that can be used with Microsoft Teams.
12. There are also options to share a desktop or an app from the lower menu. You can also mute all users as well, but this is something you can do automatically using the administrator options in Teams to have this set beforehand:



Figure 11.36 – Sharing content

13. Click the gear button in the top-right menu to see the device settings:

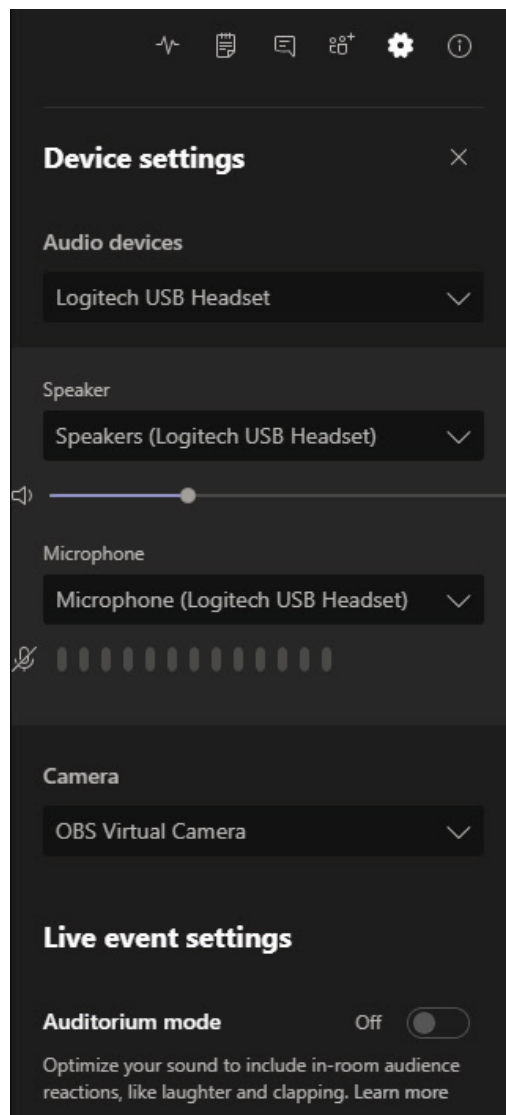


Figure 11.37 – Microsoft Teams device settings

14. This is where you set your speaker settings if you use those for playback. This is good for mixing and hearing what the auditorium will sound like. Settings will come up when using a direct mic within your computer or, like we talked about, the X32 mixer. The mixer is our sound source. Video cameras should be set on the primary camera you have set up.

15. To set the auditorium, we can use this in-room audience feature to get reactions, but the more interesting feature that is configured on your X32 soundboard is a mix-minus. What this does is you create a process in the board where people that call in can ask a question, which is then projected on the house speakers so that everyone can hear it. Then, the moderator or MC can answer questions from those who called in or joined in via the Teams app. This is needed when you want to have interactions with your audience.
16. By clicking the first choice on the settings menu, you will find the health and performance menu:

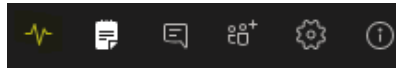


Figure 11.38 – Health and performance menu

17. This information is good to know especially when using video because the network means so much to the performance of the video feeds:

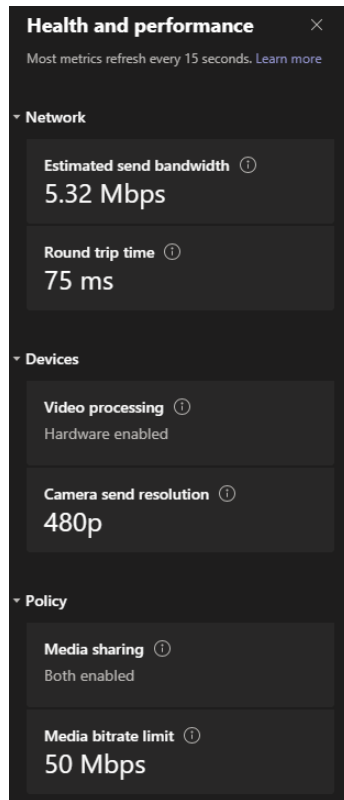


Figure 11.39 – Performance

18. The following menu is for taking notes about the event. This is for the producers and presenters:



Figure 11.40 – Notes

19. IM is used to communicate with those in the meeting:

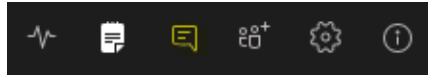


Figure 11.41 – Chat

20. If you need to add some attendees, you can do so by selecting the following icon on the menu:

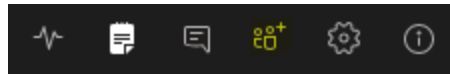


Figure 11.42 – Add attendees

There are also other things you can set in the Teams administration that will help events such as this go smoothly. Here is a list of things you can do to better support public events:

- Mute everyone automatically.
- Hide phone numbers from users who call in.
- Auto-accept attendees or make attendees wait in the lobby.
- Set up a call center to support the event using Microsoft Teams.
- Add images in the content, such as logos and other information.
- Create break out sessions and more!

As you can see, Microsoft Teams has a great platform to host live events and meetings and supports up to 10,000 attendees depending on your subscription. I really believe it is only going to get better and I am digging deeper into this because of my music background. I wanted to share at a high level what I did to make this work for my customer as it can shed light on the possibilities for your company looking to provide auditorium-sized events with outside callers. Teams is a great tool and there is so much more you can do with it.

Summary

Microsoft Teams seemingly came out of nowhere as the hero of enterprise social networking and collaboration. During the trying times that people and organizations were dealing with due to the COVID-19 pandemic, many turned to Microsoft Teams as a solution to their social connectivity issues as the workforce and education were driven home into remote working situations that many were facing for the first time. This left many admins scrambling to get up to speed with the Microsoft Teams application and the opportunities for extensibility within this platform.

Microsoft Teams offers phone communication, virtual meeting capabilities, Outlook integration, document management, and chat-in-conversation features all in one place. As amazing as Teams is from a business perspective, from an administrative perspective, it is important to understand that Microsoft Teams is a layer on top of SharePoint and not a replacement for SharePoint. It is very important that as an administrator you drive this point home to management and the decision-makers for your SharePoint project. It is also very important to remember that a solid governance plan should be created prior to rolling out Teams in your organization because although the mini features in one location are great, Microsoft Teams can grow unwieldy without proper governance and use of best practices.

In our next chapter, on SharePoint Framework, we will cover how this all works from a developer standpoint. Developers have such a vast array of tools to use to create customizations that APIs are available to alter any Microsoft application offering. Developers also have access to all SharePoint 2019 sites and content to Microsoft 365 sites, and content using data gateways, which brings this platform to another level. This is so powerful and really takes collaboration to the next level with these integrations, especially with Microsoft Teams as pulling in an app in Teams is very easy. The ideas for collaboration at this point in time are unlimited. "Why leave on-premises?" You may ask yourself whether a hybrid configuration is your best bet after reading this book.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

The answers to these questions can be found in the *Assessments*:

1. When preparing to deploy Microsoft Teams, which of the following is true?
 - a) The rollout does not take much thought or planning to be successful.
 - b) Governance and best practice considerations are important to the long-term success of the deployment.
 - c) There are no network or bandwidth considerations when deploying Microsoft Teams.
2. Your organization must have an a Microsoft 365 license to roll out Microsoft Teams. True or false?
 - a) True
 - b) False
3. Which of the following is true of the Microsoft Teams site? Choose the best option.
 - a) Behind every Microsoft Teams site is a SharePoint Online site.
 - b) When a Microsoft Teams site is created, it automatically has a SharePoint 2019 site URL.
 - c) Microsoft Teams is completely independent of SharePoint.
 - d) None of the above.
4. Having a firm communication plan when rolling out Microsoft Teams is not likely to enhance the success of the rollout. True or false?
 - a) True
 - b) False
5. Which of the Microsoft Teams roles has access to manage everything within the Microsoft Teams admin center?
 - a) Teams communication support engineer
 - b) Teams device administrator
 - c) Teams communication administrator
 - d) Teams service administrator

6. Which of the following can be extended using apps, bots, and custom connectors?
 - a) User permissions
 - b) Channels
 - c) Azure AD
 - d) None of the above
7. In Microsoft Teams, live events can be created from which menu? Choose the best answer.
 - a) New meeting menu
 - b) Privacy settings menu
 - c) Add an app menu
 - d) None of the above

Further reading

Please check out the following helpful links to further explore Microsoft Teams on your own:

- <https://docs.microsoft.com/en-us/microsoftteams/how-to-roll-out-teams>
- <https://techcommunity.microsoft.com/t5/microsoft-sharepoint-blog/sharepoint-and-teams-better-together/ba-p/189593>
- <https://support.microsoft.com/en-us/office/create-a-channel-in-teams-fda0b75e-5b90-4fb8-8857-7e102b014525>

12

SharePoint Framework

The method of SharePoint development has gone through many iterations since SharePoint 2007. In SharePoint 2007, farm solutions were all the rage. Developers had free rein to create what they wanted – the custom solutions they needed with full integration with services running on the farm. However, this did not come without risk because farm solutions could in fact bring the entire farm to a halt. Next, in SharePoint 2010, we saw the rise of the sandbox solution, which still allowed developers to create customized solutions but limited the scope of the development and the impact on the site collection. Now, of course, we have SharePoint's client-side development, which includes add-in model script infusion and is now the newest of all the SharePoint frameworks.

Although we have seen some very much necessary changes throughout the versions of SharePoint over the years, there are some updates within SharePoint 2019 that put this platform on another level. As developers, there are tools and things we need to know to understand the framework in a platform so that we can go on to develop. In *Chapter 10, SharePoint Advanced Reporting and Features*, we saw the no-code developer tools available within the platform locally and most of them were accessed on-premises environments through gateways using hybrid configurations.

In this chapter, we will look at hardcore development and how it's changed for coders. We will take a quick look at the things that you need to know before you get started on working with SharePoint 2019 development. The topics covered in this chapter could be a book in itself but we just wanted to make sure to cover them as administrators need to know these areas, and if you are an aspiring developer, this may give you some information on how to get started on your quest to become a developer. It is a great time to start because things have changed.

The following topics will be covered in this chapter:

- Developer essentials
- Developer tools and languages
- Developer best practices
- SPFx

Technical requirements

To understand this chapter clearly, you must meet the following requirements:

- Be a beginner with some experience or an intermediate developer

You can find the code files present in this chapter on GitHub at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019>.

Developer essentials

Since SharePoint 2019 is a big change from all other versions of SharePoint, there are things you need to know to move forward as a developer. As stated, we have seen so many changes over the years, especially between 2007, 2010, and 2013. These versions brought big functionality changes, which then brought development changes and changes to out-of-the-box functionality.

The same goes for this version; as you will see in this chapter, SharePoint 2019 is bringing the cloud SharePoint Online service to an on-premises environment. Although it's not patched and updated to the standard of the server used in the cloud, we do see most features available for developers. Admins do not have the same configuration features in the on-premises servers that support SharePoint Online. These features will probably never surface in an on-premises build. If they do, these features would be a great addition to environments that need administrative support.

The good thing though is that developers get almost everything SharePoint Online has to offer in SharePoint 2019. Again, things have changed, so the things you need to know and the skills you need to have add to the learning curve. If you have not been keeping up, this can be detrimental to your job search as most SharePoint on-premises work is slowly fading. Do not make the mistake of keeping a job in SharePoint on-premises development and not aspiring to learn more about the new tools.

As developers, we need to have a certain skill set, especially when developing on the SharePoint platform as this is a niche environment. There are certain things you need to know, such as how to use and understand out-of-the-box features, lists, libraries, scripting, design, and other tools that all together will make you a great developer. Business knowledge is a big plus as your background can help you understand requirements when developing solutions.

One thing I have noticed over the years is that many developers do not understand out-of-the-box functionality. I have seen developers develop functionality that is already out of the box in a document library. This is not a great way to develop. It is best to use those out-of-the-box features and code around them using the API. Even some of the best developers you meet may not fit the skill set when working with SharePoint due to this need to know the area of SharePoint.

If you are new to SharePoint, focus on the functionality within the product first. Make sure to look at all the settings within sites, lists, and libraries. Look into features such as document sets, manage copy, versioning, and all the features available that support SharePoint to make sure you do not recreate something that is already available.

The important thing to know is the functional differences between on-premises and SharePoint Online, which are listed as follows:

	SharePoint On-Premises	SharePoint Online
New features	New tools are made available using updates.	All new features are provided on the online version first. Does not mean you will see everything on-premises.
Collaboration	Admin is responsible for implementing.	Microsoft works these tools to make them better and available.
Updates	Updates and patching managed by admin.	Managed and installed by Microsoft.
Availability	Configured by the admin but can be an SLA of 99.9%.	SLA with 99.9% availability.
Backup	Backups are managed by the admin.	Microsoft ensures backup and redundancy.
External users	Access can be provided with network availability and risks associated.	Can be configured to support external users and external sites using Power Apps.
Scaling	Admin is responsible for all configuration changes.	Microsoft provides scaling.
Management	Central Administration and PowerShell.	The SharePoint admin center and PowerShell.

Figure 12.1 – On-premises versus SharePoint Online

The list of areas you will need to really understand is as follows. Make sure you study them all in order to be a good developer. There is a lot to learn and we are going to try and cover as much as we can to help those who are new and those who are looking to update their skills. Companies are looking for developers that understand these areas of SharePoint. Here are the out-of-the-box features:

- Creating web pages
- Forms
- Workflows
- SQL databases
- Master pages
- SharePoint apps
- Page layouts
- User store

- Web parts or solutions
- SharePoint ribbon
- Workflow Manager
- InfoPath
- SharePoint Designer
- Power tools in Microsoft 365
- Visio
- Visual Studio
- PowerShell

As you can see, there is a lot here. SharePoint is vast and has a lot of twists and turns. You must really dive in to be a developer on this platform. It takes skill and years of learning on projects to really be a developer on this platform. With this knowledge of just the out-of-the-box features, you will also need to know how to code.

Let's look at the coding languages that support SharePoint:

- **.NET:** Our first coding language that is a basis of the product is .NET and is used with on-premises environments when you want to develop custom web parts. This coding language is very powerful, and it supports a wide variety of features and functionality, so it must be understood to program in SharePoint. .NET is a technology that supports Windows apps and web services. It provides a way to build and run those apps and services while providing a consistent object-oriented programming environment. The code is stored locally on the server and executed locally or can be executed remotely. The latest version of the framework is available, which is 5.0 or greater for new development, and is serviced with monthly security and reliability bug fixes. There are no plans to remove .NET Framework from the Microsoft platform.
- **C#:** Our next coding language is C#, which is also one that gives you the basis to build SharePoint solutions. This is a modern, object-oriented, and type-safe programming language. You may find similarities with other languages, such as C, C++, Java, and JavaScript, as the roots of these languages are very similar. Using both C# and .NET brings the vastest server-side library to build the most robust solutions. For more information, refer to the following links:

Introduction to C#: <https://docs.microsoft.com/en-us/dotnet/csharp/getting-started/>

Get started: <https://docs.microsoft.com/en-us/dotnet/framework/get-started/>

- **JavaScript, the REST API, and jQuery:** Our next coding language is JavaScript, the REST API, and jQuery. These tools can be used to develop custom web parts to alter and control design components on a page. The **SharePoint Framework (SPFx)** is the latest, which enables you to develop web parts for SharePoint and Teams clients. jQuery can also be used in conjunction with JavaScript with C# for web part development depending on the requirements.
- **HTML5:** Coding using this language is standard for all web pages now. This coding changes the way the page is designed, so you can create a unique design for a SharePoint site. Changing the master page using HTML5 will bring a different experience to SharePoint, allowing you to design in a way where you can brand it for your company uniquely instead of using the boxy, out-of-the-box layouts in SharePoint.
- **CSS:** The CSS coding framework is available on all websites and is easy to figure out. You can almost learn this online if you have a little time to spend. CSS provides the capabilities of giving your SharePoint site a facelift and make the site look more pleasing to the eye, which works with HTML to place images and other content on the page. To avoid the boxy style, look, and feel out of the box, learn both HTML5 and CSS and this will help you create a design that works for your customers.

Now, let's turn our attention to some of the helpful tools used in SharePoint development.

Helpful tools

Working with SharePoint, especially when in a development environment, you will need to know some administration basics. Understanding the tools and the different environments where the tools are supported is a big plus. Please make sure to learn more about Azure and Microsoft 365 as you could be working in a hybrid environment where the following tools will be useful:

- **SharePoint PowerShell:** The PowerShell module is provided directly by Microsoft and allows you to manage your Microsoft 365 and Azure environments. As part of SharePoint Server 2019, it is installed on the operating system and provides a great library for administrative tasks for on-premises environments.

Link to resources: <https://docs.microsoft.com/en-us/powershell/module/sharepoint-online/?view=sharepoint-ps>

- **PnP:** The PnP module, provided by the **Pattern & Practices (PnP)** community, is managed by Microsoft affiliates to help developers and administrators. It is available for many frameworks and is the latest library. There are libraries for SPFx, CSOM, C#-CSOM for SharePoint Online, and PnP for PowerShell. PnP also gives you a way to provision template features on any site with a predefined look and feel.

Link to resources: <https://docs.microsoft.com/en-us/powershell/module/sharepoint-pnp/?view=sharepoint-ps>

- **Office 365 CLI:** Using the CLI for Microsoft 365 can help manage your Microsoft 365 tenant and SPFx projects from any platform. The platforms supported are Windows, macOS, and Linux. Using the Bash, Cmdr, or PowerShell CLIs and the CLI for Microsoft 365, you can manage various configuration settings of Microsoft 365. This tool also helps you manage SPFx and build automation scripts. The tool is provided partially by the PnP community in Microsoft.

Link to resources: <https://pnp.github.io/office365-cli/>

CLI blog: <https://developer.microsoft.com/en-us/office/blogs/new-version-of-office-365-cli-040/>

- **Azure CLI:** The Azure CLI can be used across many Azure services and is provided directly by Microsoft, which allows you to manage your Azure resources with an emphasis on automation. The Bash scripting and CLI help you get working fast with Azure. The Azure CLI offers the capability to load extensions provided by Microsoft. Extensions provide access to experimental commands and give you the ability to write your own CLI interfaces as well. It is available to install on Windows, macOS, and Linux environments.

Link to resources: <https://docs.microsoft.com/en-us/cli/azure/?view=azure-cli-latest>

Get started: <https://docs.microsoft.com/en-us/cli/azure/get-started-with-azure-cli>

List of managed services: <https://docs.microsoft.com/en-us/cli/azure/azure-services-the-azure-cli-can-manage>

- **Azure Functions:** This is a powerful way to develop ad hoc functions with serverless computer technology that accelerates and simplifies application development. Azure Functions can be invoked from Power Automate as well to perform operations and it also supports flexible scaling based on your workload volume. The tool can incorporate C# and PowerShell when needed. Use Visual Studio and Visual Studio Code on your local machine, which are integrated fully into the entire Azure platform.

Get started: <https://azure.microsoft.com/en-us/services/functions/#get-started>

Code and tools summary

As you can see, there is a vast amount of information here where all topics could be their own book. This can be frustrating for a newbie or an intermediate developer. The only advice we can give is to jump in with all your determination and win the battle. Try to find a quick way in; for example, start with JavaScript and then build from there. You can add on languages; as you can see, some complement each other and are similar in code structure.

We have not been able to really jump into these topics because of the limitations of the book, but in this section, we wanted to make sure to let you know of the possibilities of the tools available that you can use on-premises and in Microsoft 365. They are all somewhat needed in a hybrid model and some are dedicated to on-premises only, but the goal of this is to make you aware of those tools so that you can investigate and create rich experiences with SharePoint.

If you have some experience, there is still a lot to learn here and you can spend countless hours trying to figure out the best coding solution to start with. Our recommendation again is to start with JavaScript but if you're more experienced, you may already know this coding language. If that is the case, assess what is needed within your job and go for that language or look at some of the tools to see what really aligns with your company's needs. The more you can make yourself available, the more valuable you will be to your company.

If you are not actively developing in SharePoint already, make sure you leave behind all the things you learned previously on other platforms as this is a total start-from-scratch technology. Make sure to learn the basics first (out of the box) and then move on to coding so that you understand the platform. Navigate through a SharePoint site and look at the site settings to make sure you understand the functionality that is already there. We suggest learning JavaScript and PowerShell first because they will give you quick coding solutions that work well with SharePoint 2019 and SharePoint Online. This will bridge the gap from SharePoint on-premises to SharePoint Online to make you more marketable.

To learn more about other on-premises administrative tools that are not mentioned here specifically for SharePoint Server 2019, check out *Chapter 9, Managing Performance and Troubleshooting*. Please refer to that chapter to help you with identifying other administrative tools for on-premises environments.

Developer experience and teamwork

Earlier in this section, we mentioned your job experience as it really plays a big part in how you build a solution or make changes to support the end user experience. You must have a good work ethic to identify end users' problems and then find the right solution. This may take time and some testing, which may include a few different methods and skills, as we will mention in this chapter, but your job and personal experiences come into play because the more you can identify with the users' work, the better you will understand what they are aiming for.

Creating solutions for users, especially those that want a professional look and feel along with functionality, you really need to understand the end user experience. This helps guide the user within the solutions to use the functionality you develop. You need to make sure you think out your processes and make easy-to-use solutions. Again, the more you understand SharePoint and the out-of-the-box features, the better you will be at creating solutions.

When becoming a developer, always gravitate toward your strengths by looking for jobs that include the personal or job experiences you have. For example, if you were a security guard, learn how SharePoint and Microsoft 365 could help a company like that and see what type of solutions you would build for them to make the company more automated and work smarter. This is your strength, not your weakness.

The types of jobs available for developers that you will see all the time in job posts are the following:

- **Full stack engineer:** An engineer who can handle both frontend and backend work where they can create a fully functional web application.
- **Frontend engineer:** User interface developer, which includes visual elements such as layouts and aesthetics.
- **Backend engineer:** Uses APIs to integrate data systems, caches, and email systems and takes on underlying performance and logic in applications.
- **Software engineer (TEST):** Validates the quality of the application using automated tests, tools, and other methods to validate the product.
- **DevOps engineer:** Builds, deploys, integrates, and administers application infrastructure, database systems, and servers.
- **Security engineer:** Specializes in creating systems, methods, and procedures that test the security of a software system. Exploits and fixes flaws as they penetrate to discover vulnerabilities.

Finding an eagerness to learn really starts with your interests. Find a job you believe you will enjoy. If you love to design things and have an artsy-type background, you may want to stick with trying to aspire to be a frontend engineer. If you love data and working with reports, you may want to look at being a backend engineer. It's all in what you want but it's best to get into something that piques your interest; otherwise, you will end up dropping out of classes and be bored with the work to achieve these goals.

Once you achieve these goals, there are players in the development teams you need to know about. We will explain some other members that become important to your everyday work.

Team members

As we saw earlier when we talked about skill sets and teams, there is a position that helps in these types of situations where you need guidance on the direction of a solution. This is where the business analyst comes in and can help you determine requirements, and since they should have a SharePoint and coding background, they can help you identify those features you may need to research and/or customize to make the solution work. In Agile project management, as explained in the next section, this is a Product Owner. This is a necessary team member in heavily developed SharePoint environments. They interface with the users and meet with them to gather requirements. If you use Jira, you will see the stories these team members create, which are worked on as a team, but the initial stories will be entered by a business analyst.

You could also encounter a Scrum Master as Agile project management is really surging as the go-to project management tool. This project management style is, I have to say, very useful, especially with development. I was on a team that used this methodology and it really helps to keep track of what is going on within the teams associated with the product they support. Daily standup meetings come into play that are centered around stories, which are requirements broken down into stages considering the customers' needs and how we build out those solutions within the SharePoint platform. Please read more on Agile at the following link. I encountered the company Scaled Agile recently and like their approach to learning the craft:

<https://www.scaledagile.com/>

Training users

This activity goes right along with requirements as the requirements need to be met so that the user can put two and two together when looking at what they told you and what you bring to them to demo. Your demo will determine whether you have hit the mark when it comes to the development of the solution and if not, they can let you know of any areas that may seem rough that they want to be done a little differently.

Once those areas are updated and tested and you have determined that the user has no other concerns or bugs, then you can have the users test the solution themselves in a test environment, which you would need to vet the changes for first through a tester prior to delivery to the test users. This way, the users have access to the product that was vetted by a separate member of your team or another team. Also, if you want to hold their hand before releasing the solution, you can do a training session with them to make sure they understand the solution.

Your business analyst, or Product Owner, in Agile project management controls the interactions between you and the customer along with the Scrum Master. They also need to be well versed in the product you are supporting as they could have been a developer in the past or worked with a particular software intensely for years. This team member is key because they make recommendations to the customer on the requirements and also create stories about those requirements for you, the developer. Again, this is a very key interaction between customer and developer.

As mentioned, Agile will play heavily in a development team if this project management style is being used within your company. The stories you receive have time limitations and you can help grade the length of developing those areas with the team using story points and using a process called Planning Poker. This helps the team look at what are called backlog stories to help determine what stories should be next in line, as well as determining how much time each will take to complete and who should be responsible for the work. Read more on Agile project management so that you will not be surprised in this environment.

For me, using Agile was a great learning experience and I will tell you that those standup meetings can be brutal if you do not have the work completed in a timely fashion. This method promotes healthy dialog, learning from peers, and an organized development process, and also uncovers those that are not performing. Team dynamics are very important and in the experiences I have had, you really needed to be sharp because, on this side of IT, you can get eaten up quickly. If you want to be a developer, you have to know the craft *well*, especially in this environment.

Documentation

Make sure to document bug fixes; we will get into more detail about developers' best practices later in this chapter. We want to make sure you understand the processes involved and what you are expected to do as a developer. Document any thing and everything is needed so that you can capture where code fails; plus, it helps you to grow as a developer.

Not every shop is the same and some shops use Agile to manage projects, where code will be pushed quickly by separating requirements into chunks. This helps the business analyst to support the users and the developer to understand the requirements for working together as a team. This will also require you to be in daily meetings where you update your team on your assigned tasks. These chunks of coding projects are called Sprints.

We will not get into this much in this book, but we wanted to point Agile out especially for developers because you will be held under a microscope. I was on a contract with this style of project management and it really helped me grow. Being put on display every day to show what you have accomplished face to face with your manager and teammates will keep you on task, but if you are not doing the work or do not understand it, everyone will see your limited skill set openly.

Jobs and certifications

Find jobs at the beginning stages, if you are a newbie, that you can handle easily before you move on to bigger and better ones. This even goes for seasoned professionals because you may not have used the platform or will be new to some of the new coding languages. Gain some experience and then start taking on jobs you cannot yet handle but can get through the interview process for.

Doing this will build your character and your knowledge, especially when working with other developers that can be mentors to you. We should say that this may be hard in some cases as when you work with great developers, they can be the most critical of you. So, you must be tough and withstand the pain and even insults to your skills so that you can grow and exceed their abilities in the future. You must have a thick skin, unfortunately.

If you do not have the ability or time to provide due diligence to learn the platform, you will fail. We can tell you that right away. It takes some time, determination, and bumps and bruises to learn this platform as a newbie for an admin or developer. Even with the changes we are seeing in SharePoint 2019 and SharePoint Online, you will find yourself learning new tools and languages even if you are a seasoned professional.

There are several certifications for SharePoint that you can find on Microsoft's site. These certifications also help you to be more marketable and display your eagerness to learn and provide credible skills needed by a company. You can learn more about certifications at the following link, but we did not want to list them because they change often, so please look at what is available at the time you're reading:

<https://docs.microsoft.com/en-us/learn/certifications/browse/>

Also, if you want to start to learn from authorized training, please check out the following link:

```
https://www.linkedin.com/learning/subscription/topics/
sharepoint?trk=sem_src.pa-bi_c.bng-lil-sem-b2c-nb-dr-
namer-us-lang-en-biz-beta-desktop-core-tier2-sharepoint_
pkw.%2Bmicrosoft+%2Bsharepoint+%2Btraining_pmt.
bb_pcrd.77240797721612_pdv.c_trg.kwd-77240851810630%3Aloc-190_
net.o_learning&hero=10&veh=sem_src.pa-bi_c.bng-lil-sem-
b2c-nb-dr-namer-us-lang-en-biz-beta-desktop-core-tier2-
sharepoint_pkw.%2Bmicrosoft+%2Bsharepoint+%2Btraining_pmt.
bb_pcrd.77240797721612_pdv.c_trg.kwd-77240851810630%3Aloc-190_
net.o_learning&src=pa-bi&gclid=%5B*GCLID*%5D
```

Where do you start? To get started with working on your skills, you need training and an environment to play in. Let's look at how to set up a development environment and what things we can use to help us get things in place to start our journey.

Setting up a development environment

Before you can start using the tools, look at some training, but you must also have an environment to use to set up SharePoint 2019 and install the tools on the server. When setting up your environment, refer to this book; you can use this book to set up your environment from an installation perspective. If you are using a laptop or desktop, there are several virtual software options available for you to use on those platforms. You can also purchase a used server on eBay, lease a server from a hosting company, or set up a server in the cloud using AWS or Azure (if you have the funds). Some cloud platforms offer free subscriptions for a period.

The SharePoint 2019 download is located on the Microsoft website and offers a free 90-day trial:

```
https://www.microsoft.com/en-us/download/details.aspx?id=57462
```

Again, if you are setting this environment up for a company you are supporting, ask them to give you an individual server. Make sure you are not setting up a server that supports many developers. The reason why is you can step on each other's toes, especially for reboots, and coding can overlap if you are not careful.

The environment should consist of the following server resources:

- 16 GB of RAM or more
- 500 GB of disk space or more
- Four cores of virtual processors or more
- A laptop or desktop compatible with the virtualization
- Licenses for SharePoint 2019 and any other integrated applications

The choices for virtual server host and other options are as follows:

- **VirtualBox:** This is a software platform used for personal usage environments, such as laptops, desktops, or even servers, but we do not recommend this platform for production environments: <https://www.virtualbox.org/>.
- **VMware:** The free version of VMware Player can be sufficient for testing, but for development, this solution can quickly become insufficient: <https://www.vmware.com/products/workstation-player/workstation-player-evaluation.html>.
- **Hyper-V:** This is the option used in this book to set up servers for installation. Microsoft provides this ability within the Microsoft operating system by configuring the server options: <https://docs.microsoft.com/en-us/virtualization/hyper-v-on-windows/quick-start/enable-hyper-v>.
- **Parallels:** This gives you the option to run Windows on macOS but is not free if you want to virtualize Windows environments. The pricing for the product is not bad and you pay by year. We have never used it, so we cannot give any reviews, but it's worth a try if you strictly use macOS: <https://www.parallels.com/>.
- **Azure:** This is a cloud infrastructure environment provided by Microsoft and provides 12 free months of service: https://azure.microsoft.com/en-us/free/search/?OCID=AID2100131_SEM_1aa5a26fbf5a139881e0fdf61ec56fb0:G:s&ef_id=1aa5a26fbf5a139881e0fdf61ec56fb0:G:s&msclkid=1aa5a26fbf5a139881e0fdf61ec56fb0.
- **Microsoft Partner Program:** Microsoft offers an Action Pack subscription for those who are looking to work with Microsoft products. This could be a small company or a newbie looking to start developing, but you gain access to licenses for their software products: <https://partner.microsoft.com/en-US/>.

- **AWS:** This is a cloud infrastructure environment provided by Amazon. The service has a free tier that can be used for development and testing: <https://aws.amazon.com/>.
- **Rackspace:** This is another cloud infrastructure environment that has awesome engineers who can support you with using SharePoint. You will not find this in a lot of other offerings: <https://www.rackspace.com>.
- **Team Foundation Server:** This is used to version code and publish code within an environment. It is also used to package code for testing and integrates with Visual Studio: <https://www.microsoft.com/en-us/download/details.aspx?id=48260>.

Let's take a look at the modern and classic SharePoint sites. This book does not thoroughly explore the SharePoint user interface; however, these two types of SharePoint sites are important to discuss because the differences could inform your development choices.

Modern or classic?

This will be our only topic that has to do with the user interface for SharePoint in the book really. The reason for this is very important because you must know what the differences between a classic and a modern site are. There are two experiences you can choose from within SharePoint 2019: one is modern and the other is classic. These experiences bring different functionality and aspects to the SharePoint Server 2019 site experience, which is different from all the other versions of SharePoint. SharePoint Server 2016 has some updates to the classic experience but was never designed like SharePoint 2019.

The reason why these are important is that there are two distinct ways you can create content in SharePoint 2019 sites. When we refer to classic, it is just like referring to what Windows Authentication was called in SharePoint 2007 and 2010. It is the native way of doing things from when a product was created, sort of like a legacy version of a component.

When we refer to modern, we are referring to the most up-to-date way to display content or interact with features within sites. This way of displaying content also brings a new way of using sites, lists, and libraries. Remember, this will take some thought and training before it is exposed to your user community.

Your users need to know about changes implemented like this because everything changes at this point. The classic lists and libraries look and feel goes away and links to areas we used in site actions along with how to navigate to certain actions will change. This could be a learning curve for your users, so you need to really make them aware of what you are doing before you do it.

If you like your classic experience, then stick with the classic, but if you want some cool updates to your sites, lists, libraries, and other areas where the cloud can be supported by SharePoint 2019 using modern features, then you should upgrade. This upgrade brings a new set of Microsoft 365 cloud power tools, which are only made available in this experience. So, if you are using an on-premises gateway, then this is the only way you will be able to take advantage of the tools in the cloud and use them on-premises.

As a developer, this is important because if you do not have access to power tools in the cloud and are asked to develop something on a classic site using those tools, you need to make the users who want this change aware of the changes you have to implement before you can even get started.

Let's see what the differences between the classic and modern experiences are and what they look like in SharePoint 2019.

The modern experience

The modern experience in SharePoint Online and SharePoint 2019 is designed to be mobile, flexible, and easier to use than the prior classic experience. Although SharePoint Server 2019 supports the modern experience, you will notice that it is supported in several areas but not all features within SharePoint 2019. We will not cover all of these new experiences but will cover some you will want to be aware of.

The following experiences are modern by default:

- The SharePoint start page
- Lists and libraries
- New team site and communication site home pages
- New pages
- Site contents
- Site usage
- Recycle bin

In the following screenshot, you can see how the classic feel gives a legacy display of a library:

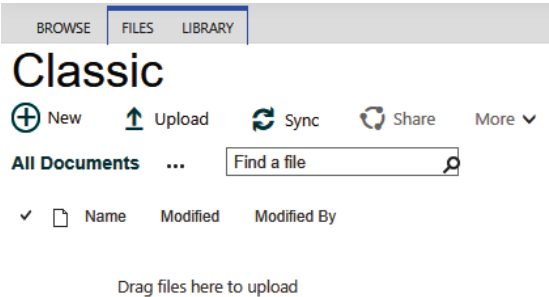


Figure 12.2 – Classic library

The following screenshot shows what the modern library looks like:

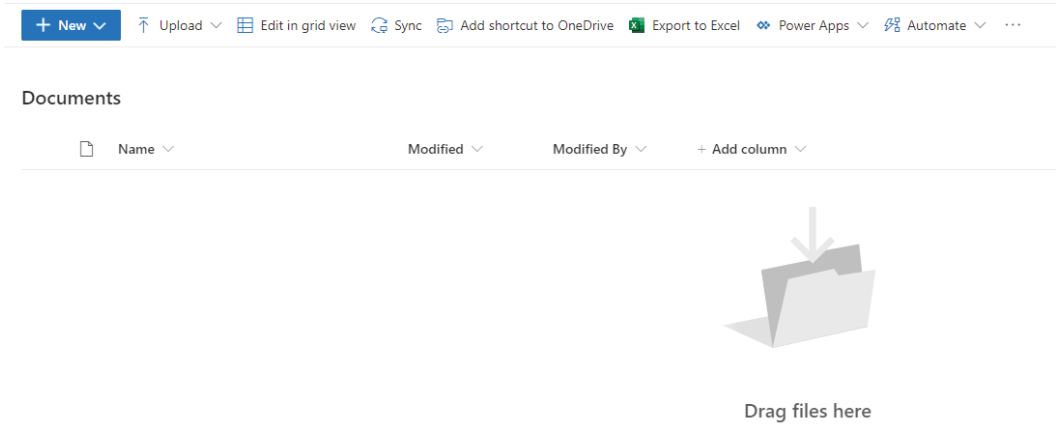


Figure 12.3 – Modern library

You can see from this screenshot of a modern library how the list has changed from the classic list screenshot. Users will be confused right away with how to use this library due to the differences from the classic view.

The SharePoint start page

This page has changed drastically, and you can see from the following screenshots that we have a new way of displaying information on our main page. This is what the classic page looks like:

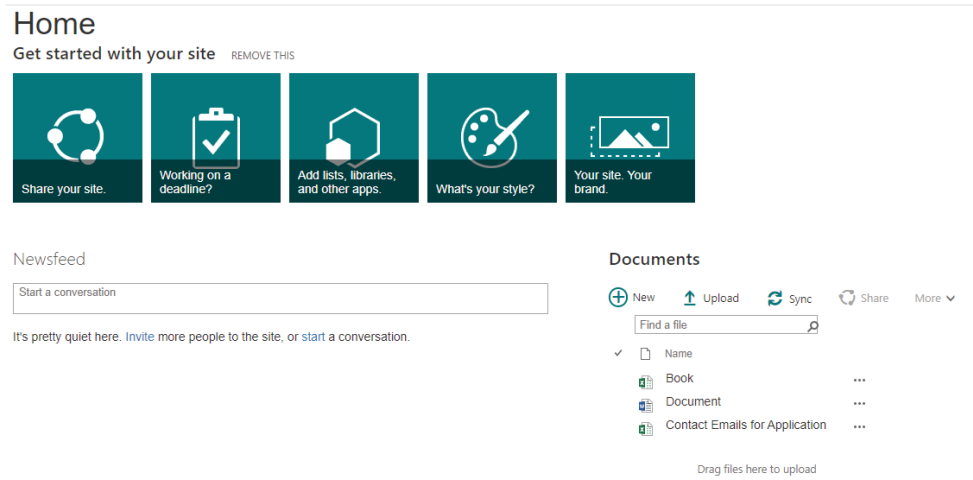


Figure 12.4 – Classic view

Here is what the modern page looks like:

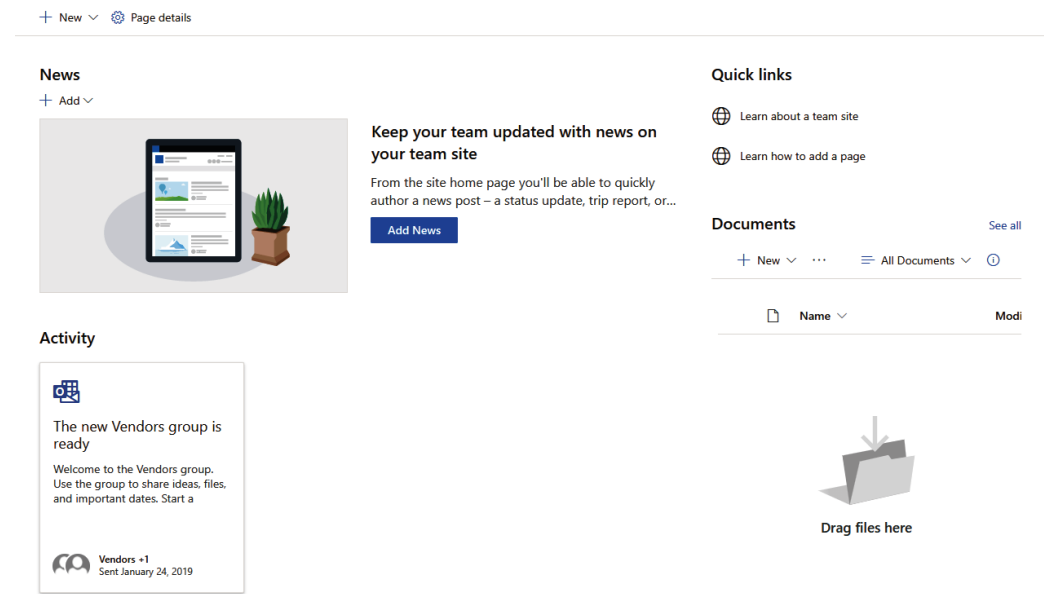


Figure 12.5 – Modern view

There are many areas Microsoft has tackled in using modern templates, but there is still more to be done. As you can see, not everything is customizable using this type of site. We suspect with the change from SharePoint Designer and InfoPath coming soon, there will be no more classic sites and everything will be modern in the next couple of years.

Site usage analytics

This component has a new look. It's very easy to look at analytics and see popular content on the site using this tool:



Figure 12.6 – Site analytics

Team sites and communication sites

There is also a new modern team site and an additional new communication site. Team sites got a facelift, as you can see from the SharePoint start page example. Communication sites are new, and they give you the ability to share news, reports, statuses, and other great information you can see in a visual format. Communication sites are like classic publishing sites but are simpler to create and do not need that legacy publishing site infrastructure (but boy do we remember that headache).

Search

Unfortunately, we haven't gone too much into search in this book but we wanted to mention this when it comes to modern sites. SharePoint Server 2019 comes with a modern search experience and you will be able to see results before typing in the search box. The results come in real time, so as you continue to type, the results update and change right on the page.

The modern search boxes can be found on the home page, communication sites, and modern team sites. There will be options to change where the results come from, such as a site you may have searched on but did not mean to search. Then, you have other options to refine your results. There is also a **Show more results** option that expands from the bottom of the search box and you can open the search results page and look at more details:

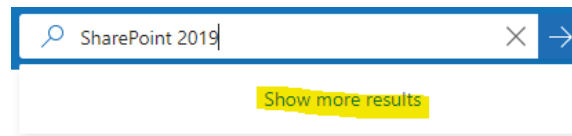


Figure 12.7 – Modern search experience

Other things for you to research are listed as follows, related to the modern experience:

- List column calculations and column formatting
- SPFx client-side web parts and extensions
- Webhooks
- Asset packaging – hosting your solution assets automatically from app catalog site collection
- Tenant scoped deployment – deploy your web parts across the farm just by installing them to the app catalog
- ALM APIs for add-on and SPFx solution management

What is not supported in modern sites are as follows:

- Site designs and site scripts
- Hub sites
- Custom modern themes – out-of-the-box modern themes are available for team sites and communication sites
- Site collection app catalog (potentially supported by RTM)

Supported browsers

SharePoint supports several web browsers that are most used, such as Internet Explorer, Mozilla Firefox, and Safari. However, some browsers may cause some functionality to be limited or available only through some alternative steps. At times, some of the functionalities may not be available for noncritical administrative tasks.

The following chart quickly summarizes some key points in user interface design:

User Interface Design Framework Key Points	
Classic Sites	Classic sites are fully customized. You can create a master page and page layouts and set up everything inside the master page and page layouts. You can use the REST API, JSON, and CSOM to customize classic sites.
Modern Sites	Modern sites are not fully customized. We can use SPFx to customize modern sites, but we have less options as compared to classic site customization. We can integrate many applications with the modern user interface easily.
SPFx	This is a framework for customizing the modern user interface. We can use the Angular, React, or JavaScript frameworks with SPFx for customizing SharePoint.

Figure 12.8 – Design framework key points

There is so much to learn within this platform, and we have only touched the surface. This section aimed to help explain starting points and what you should be concentrating on as a developer. There are many applications to get used to and even if you are used to them, there are still changes in SharePoint 2019 that you need to address. In this next section, we will talk about SPFx and what it is, some history, what has changed, and how to get started.

SPFx overview

A brief history of SharePoint development follows. In the past, SharePoint development has consisted of the following methods: farm solutions, sandbox solutions, script injection using content editors and script editor web parts, and the SharePoint add-in/app model. The modern way to develop in SharePoint is through SPFx. Before we get into our examination of SPFx, let's go over the previous forms of SharePoint development:

- **Farm solutions:** Farm solutions were the original development method for SharePoint. They involved creating full-trust code and employing **WSP**. WSP is the file extension for the Windows SharePoint solution. This form of development allowed great creativity within SharePoint because developers could do pretty much whatever they wanted to do. Microsoft introduced full-trust farm solutions with SharePoint 2007. Developers were able to write fully customized server-side solutions using ASP.NET. Using SharePoint's API, developers could create solutions that integrated timer jobs and web parts. However, having the ability to write full-trust farm solutions using ASP.NET came with some obvious risks. Farm solutions are hosted in the IIS worker process (`W3WP.exe`), so the scope of possible impact is wide. Fully customized code can, and sometimes does, contain errors. A poorly created web part could bring down an entire SharePoint farm. For this reason, farm solutions are no longer allowed in SharePoint 2019 and SharePoint Online.

- **Sandbox solutions:** Sandbox solutions use `SPUCWorkerProcess.exe`. Code is contained in the SharePoint user code solution worker process. Sandbox solution code cannot affect the entire farm and its impact is contained to the site collection that the solution targets. Since the sandbox solution does not involve the IIS worker process and IIS application pool or IIS server, it does not have to be restarted. With the rollout of sandbox solutions in SharePoint 2010, site collection administrators were able to deploy solutions specific to their site collection without having high-level farm admin rights.
- **Script injection:** With the rollout of SharePoint 2013, Microsoft made the pivot to its preference for using the client-side framework for the development of custom master pages and branding. With this change, we began to see the move toward JavaScript injection. This method allows developers to write custom applications and push those scripts onto the page. Utilizing client-side development, users were able to add, modify, or remove elements from the SharePoint page.
- **App model (add-ins):** Starting with SharePoint 2013, Microsoft began to recommend that development within SharePoint use the app model. Within the app model, solutions are packaged in a `.APP` file. This file contains many files, including the SharePoint solution packages, any custom actions or customized app parts, web deployment packages, and more. As we stated in *Chapter 7, Finalizing the Farm to Go Live – Part II*, start to migrate your farm solutions to the add-in model to position yourself for migration to the cloud.

Please refer to the links in the *Further reading* section for more information on SPFx.

What is SPFx?

Now that we've explored the previously popular methods of SharePoint development, let's look at Microsoft's current development method, SPFx. SPFx is a Node.js and TypeScript development platform. One of the great benefits of SPFx is that it provides a faster browser experience. Another benefit is that SPFx is automatically responsive, so no matter the device, solutions will render in the appropriate aspect.

SPFx is used in the development of pages and web parts for SharePoint 2019 and SharePoint Online. In this chapter, we will give an overview of the latest SharePoint framework, as it relates to SharePoint 2019 in SharePoint online. We will briefly discuss how this framework is used in Microsoft Teams development as well. The Microsoft SharePoint framework is a client-side tool that gives developers what they need to extend SharePoint and create client-side solutions to best serve their customers' needs. See the following comparison chart, which gives a quick snapshot of the key differences between traditional SharePoint development and SPFx:

Comparison	Dev Server	Package	Templates	Build Tasks	Language	Editor
Traditional SharePoint Development	IIS Express	NuGet	Visual Studios Project Templates	MSBuild	C # and Javascript	Visual Studio
SPFX	Node.js	NPM	Yeoman	Gulp	TypeScript	Visual Studio Code

Figure 12.9 – Traditional SharePoint development versus SPFx

In this chapter, we will not do a deep dive into development methods and coding; however, Packt Publishing has a book that does a deep dive into SPFx. We will give details on how to set up your development environment and discuss some of the best practices to remember when developing solutions. The following are some of the key features of SPFx:

- SPFx client-side solutions can be used on all SharePoint sites, unless limited by the administrator.
- SPFx solutions can be created to extend the functionality of Microsoft Teams.
- Client-side web parts can be built using HTML or JavaScript.
- SPFx applies to both SharePoint Online and on-premises.
- SPFx is framework-agnostic, therefore you can use any JavaScript framework.
- The SharePoint client-side framework is supported both on-premises and online. Therefore, solutions created for the on-premises environment will migrate to SharePoint Online. This is important when road-mapping for the future state of your environment.
- Due to the use of common open source client-side development tools, developers that were not SharePoint developers before can now develop SharePoint solutions using SPFx.
- SPFx web parts can be added to classic and modern pages.
- SPFx can be used to create both client-based web parts and extensions that customize applications, commands set, and fields in lists or libraries.

Now that we have something of an understanding of what a developer can do, let's look at how we can create a server environment to support our new learning. We need to use the environment we created to try and develop on the platform. This will help us to understand how the developer tools are set up but, most importantly, give us a place to play with those tools once they are installed. If you are planning to take classes, this is the best way to get started as while learning, you can also do each lesson on your development servers. This will capture what you learned as well as giving you a way to enhance what you learned by making changes to those lessons within the class later after the class is over. So, let's dive into setting up our development environment!

Setting up a development environment to create SharePoint framework solutions

When setting up your development environment, you could use Visual Studio or a custom development environment to build your SharePoint framework solutions, and you can build these in Windows, macOS, or on the Linux platform. Please take the following listed steps to set up your development environment. Microsoft has recently moved from SPFx version 1.10 to version 1.11. As always, when following the instructions, check the documentation and make sure that you are installing the correct versions of development software. The following steps apply to SPFx 1.11.

The first thing that you need to do to set up a development environment is install Node.js. See the following chart for the Node.js version needed:

SharePoint Version	Node.js Version
SharePoint 2019	v10.x.x
SharePoint Online	v10.x.x
SharePoint 2016	v8.x.x

Figure 12.10 – Determine the version you need

Note

Node.js v9.x, v11.x, and v12.x are not supported in SPFx development.

You can check to see whether you already have Node.js by using the following steps:

1. Open Command Prompt in PowerShell.
2. Type `Node -v` in the command line.
3. Press *Enter*.

If you have no version of Node.js installed or a version other than the currently supported v10.x.x for SharePoint 2019 and SharePoint Online, you must use the following steps to download the correct Node.js version.

Install Node.js

Let's look at the steps to install Node.js:

1. Navigate to the following link: <https://nodejs.org/en/download/releases/>.
2. Choose **Node.js 10.x**:

Previous Releases

io.js & Node.js

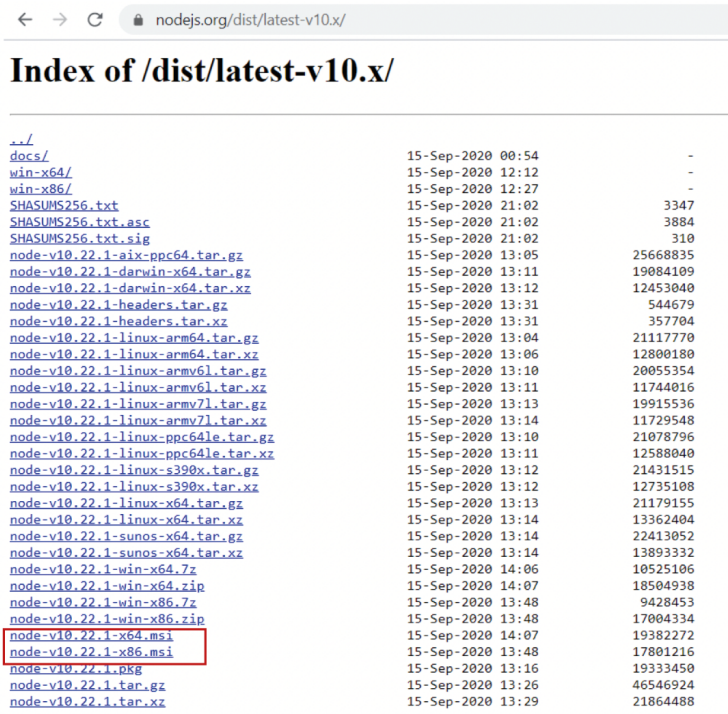
Releases 1.x through 3.x were called "io.js" as they were part of the io.js fork. As of Node.js 4.0.0 the former release lines of io.js converged with Node.js 0.12.x into unified Node.js releases.

Looking for latest release of a version branch?

- Node.js 12.x
- **Node.js 10.x**
- Node.js 8.x
- Node.js 6.x
- Node.js 4.x
- Node.js 0.12.x
- Node.js 0.10.x
- All versions

Figure 12.11 – Choosing the version you want to install

3. You will see a list of Node.js versions. At the time of this book's creation, the supported version of Node.js is 10.22.1. If you are using Windows, choose either the 64-bit or 86-bit MSI version depending on your machine:

A screenshot of a web browser showing the Node.js distribution index page. The address bar shows 'nodejs.org/dist/latest-v10.x/'. The page title is 'Index of /dist/latest-v10.x/'. It lists various download links for Node.js 10.22.1 across different operating systems and architectures, along with their file sizes and last modified dates. The 'node-v10.22.1-x86.msi' file is highlighted with a red rectangle.

docs/	15-Sep-2020 00:54	-
win-x64/	15-Sep-2020 12:12	-
win-x86/	15-Sep-2020 12:27	-
SHASUMS256.txt	15-Sep-2020 21:02	3347
SHASUMS256.txt.asc	15-Sep-2020 21:02	3884
SHASUMS256.txt.sig	15-Sep-2020 21:02	310
node-v10.22.1-aix-ppc64.tar.gz	15-Sep-2020 13:05	25668835
node-v10.22.1-darwin-x64.tar.gz	15-Sep-2020 13:11	19084109
node-v10.22.1-darwin-x64.tar.xz	15-Sep-2020 13:12	12453040
node-v10.22.1-headers.tar.gz	15-Sep-2020 13:31	544679
node-v10.22.1-headers.tar.xz	15-Sep-2020 13:31	357704
node-v10.22.1-linux-arm64.tar.gz	15-Sep-2020 13:04	21117770
node-v10.22.1-linux-arm64.tar.xz	15-Sep-2020 13:06	12800180
node-v10.22.1-linux-armv6l.tar.gz	15-Sep-2020 13:10	20055354
node-v10.22.1-linux-armv7l.tar.gz	15-Sep-2020 13:11	11744016
node-v10.22.1-linux-armv7l.tar.xz	15-Sep-2020 13:13	19915536
node-v10.22.1-linux-ppc64le.tar.gz	15-Sep-2020 13:14	11729548
node-v10.22.1-linux-ppc64le.tar.xz	15-Sep-2020 13:10	21078796
node-v10.22.1-linux-s390x.tar.gz	15-Sep-2020 13:11	12588040
node-v10.22.1-linux-s390x.tar.xz	15-Sep-2020 13:12	21431515
node-v10.22.1-linux-s390x.tar.xz	15-Sep-2020 13:12	12735108
node-v10.22.1-linux-x64.tar.gz	15-Sep-2020 13:13	21179155
node-v10.22.1-linux-x64.tar.xz	15-Sep-2020 13:14	13362404
node-v10.22.1-sunos-x64.tar.gz	15-Sep-2020 13:14	22413052
node-v10.22.1-sunos-x64.tar.xz	15-Sep-2020 13:14	13893332
node-v10.22.1-win-x64.7z	15-Sep-2020 14:06	10525106
node-v10.22.1-win-x64.zip	15-Sep-2020 14:07	18504938
node-v10.22.1-win-x86.7z	15-Sep-2020 13:48	9428453
node-v10.22.1-win-x86.zip	15-Sep-2020 13:48	17004334
node-v10.22.1-x64.msi	15-Sep-2020 14:07	19382272
node-v10.22.1-x86.msi	15-Sep-2020 13:48	17801216
node-v10.22.1.pkg	15-Sep-2020 13:16	19333450
node-v10.22.1.tar.gz	15-Sep-2020 13:26	46546924
node-v10.22.1.tar.xz	15-Sep-2020 13:29	21864488

Figure 12.12 – Finding MSI files for installation

4. My compatible version is x64. Double-click the link to download and double-click the package to install. Once the installation window opens, click **Next**:

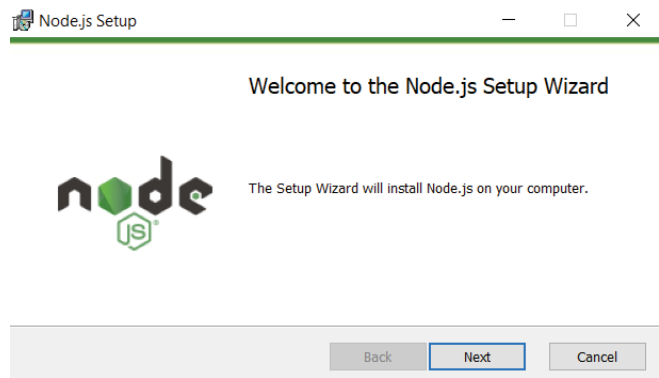


Figure 12.13 – Install splash screen

5. Read then accept the licensing agreement, and then click **Next**:

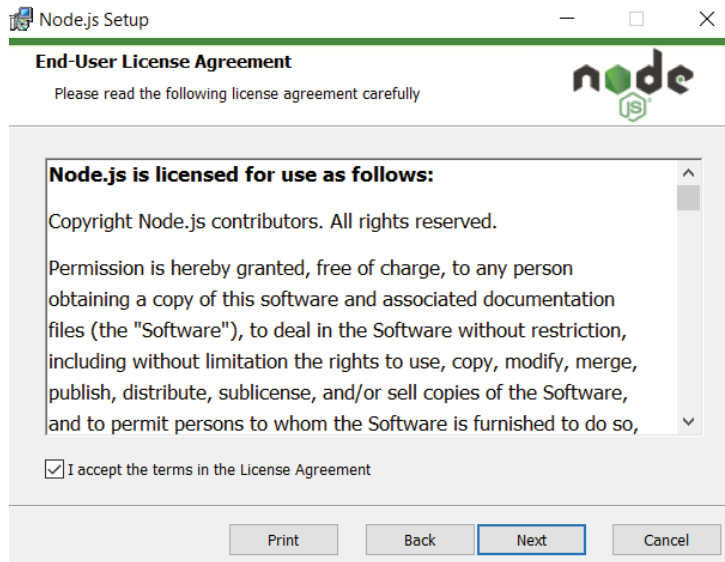


Figure 12.14 – Accepting the license agreement

6. Choose the location for installation or go with the default:

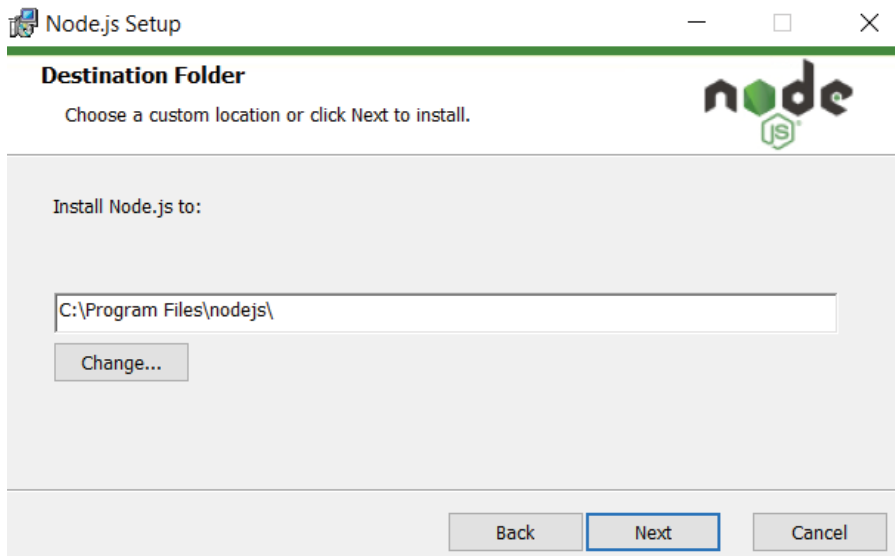


Figure 12.15 – Choosing where to install Node.js

7. Select **Next**:

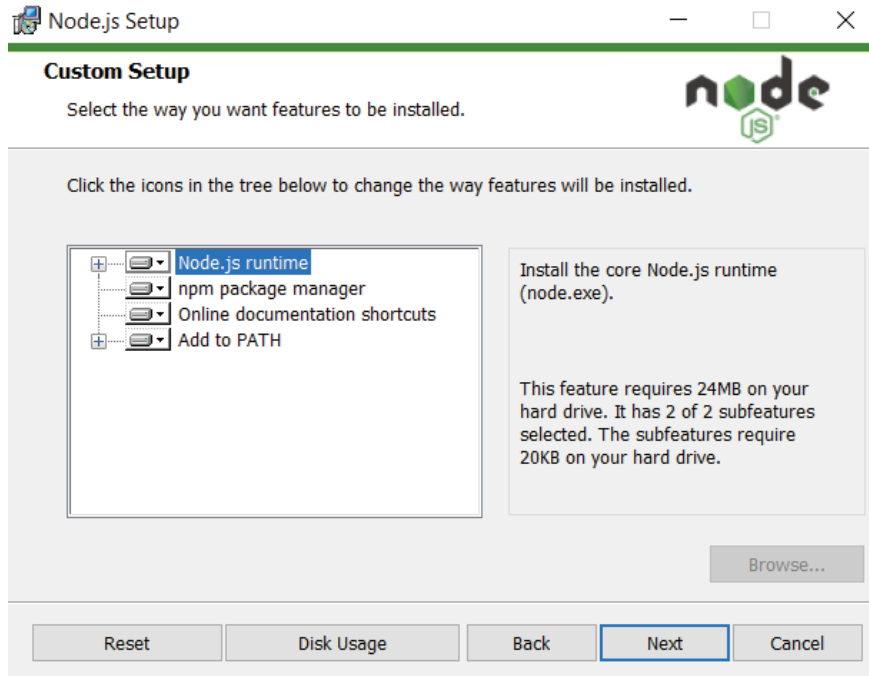


Figure 12.16 – Choosing features

8. Click the **Install** button to begin installation:

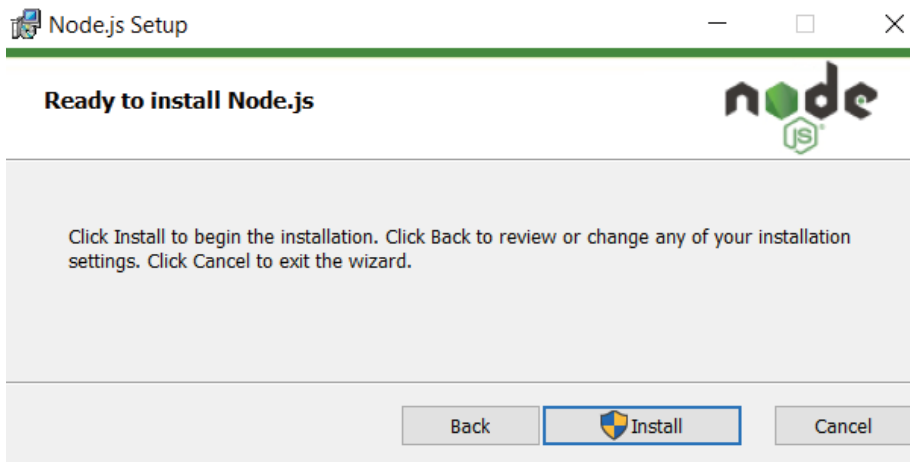


Figure 12.17 – Installation screen

9. Allow the package to copy files to your machine:

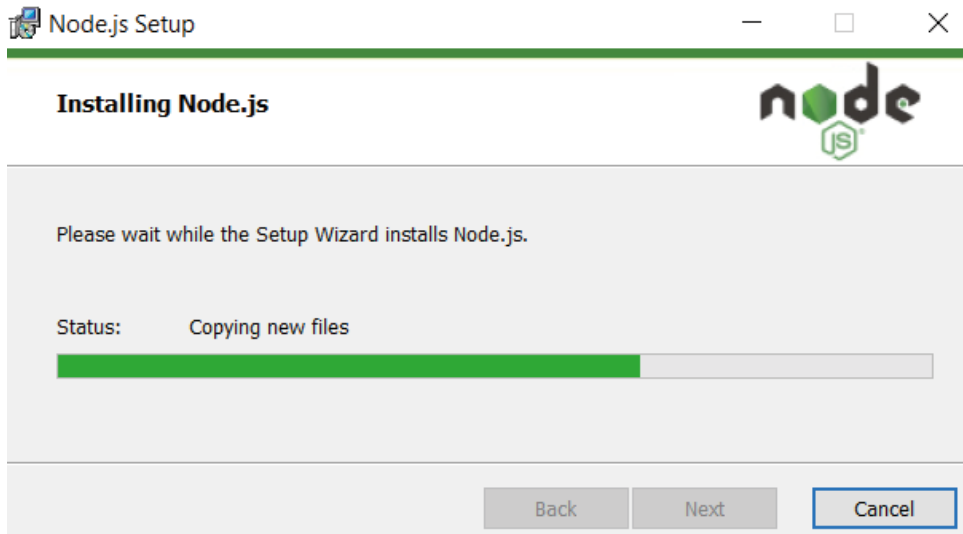


Figure 12.18 – Install progress

10. Click **Finish**:

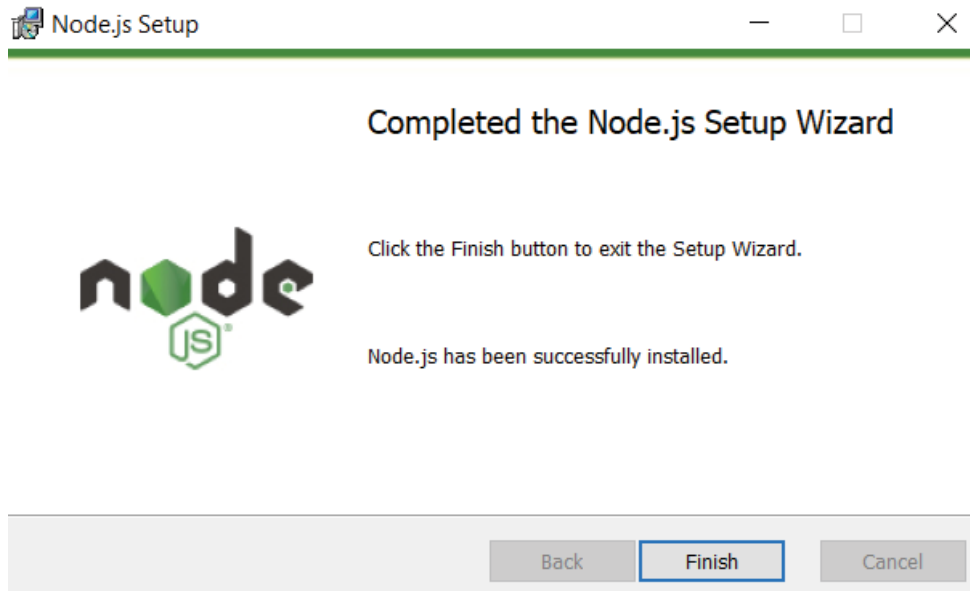


Figure 12.19 – Finishing setup

11. Verify that Node.js is installed on your computer by using the following command:

```
Node -v
```

And you will see the following as result:

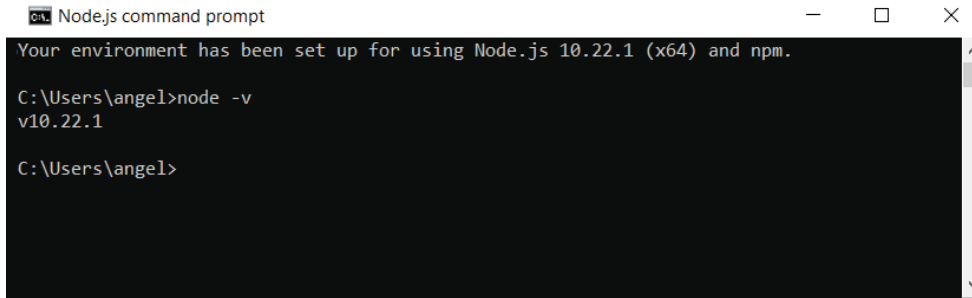
A screenshot of a Windows command prompt window titled "Node.js command prompt". The window has standard Windows window controls (minimize, maximize, close) in the top right corner. The text inside the window reads: "Your environment has been set up for using Node.js 10.22.1 (x64) and npm." followed by a new line. Then, the command prompt shows "C:\Users\angel>node -v" and the output "v10.22.1". Below that, it shows "C:\Users\angel>" on a new line, indicating the prompt is ready for another command. The background of the command prompt is black with white text.

Figure 12.20 – Node.js is ready

Now that we have installed Node.js, let's install a code editor.

Visual Studio setup

Whether you are using Visual Studio or a different product as your code editor, it is important that you have your structure and naming conventions determined. Please take the time up front to design a proper project structure and naming convention within your editor and stick with this throughout not only your current project but also future projects. Having a standardized naming convention will help you organize your projects and provide knowledge transfer when the time comes. There is nothing worse in the world of tech than having an application break and going to view the source code and not being able to make head nor tail of what you find in the code repository.

Installing Visual Studio Code

If you do not have a code editor installed already, you need to install one. In this book, we will use Visual Studio Code as our editor. There are other choices you can look into, such as Atom or WebStorm, so see which one of these works for you. To install Visual Studio Code, follow these steps:

1. Navigate to the Visual Studio Code site located at [https://code/visualstudio.com](https://code.visualstudio.com) and click the **Download for Windows** button:

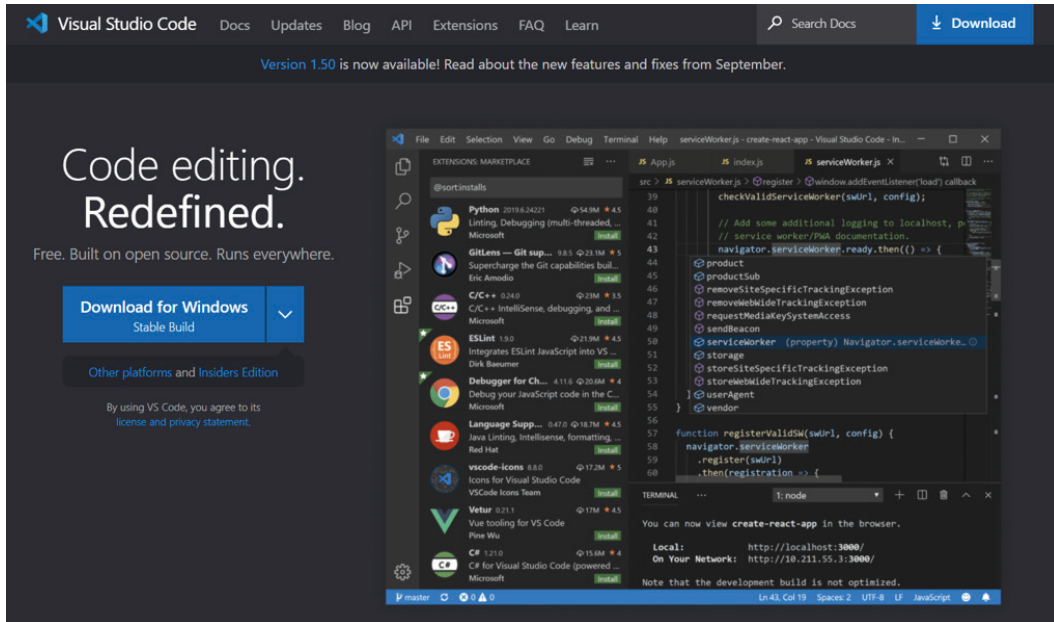


Figure 12.21 – Visual Studio download page

2. Double-click the downloaded package to begin the installation. Accept the license agreement, then click **Next**:

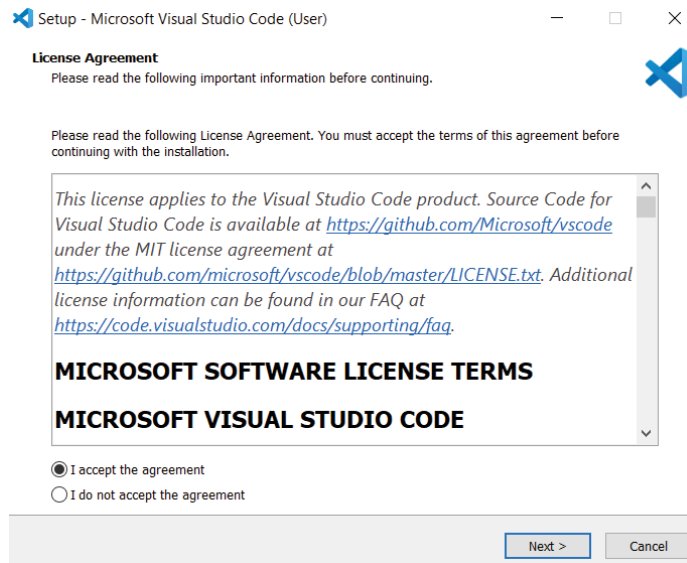


Figure 12.22 – Accepting the license agreement

3. Choose the location of the installation or keep the default:

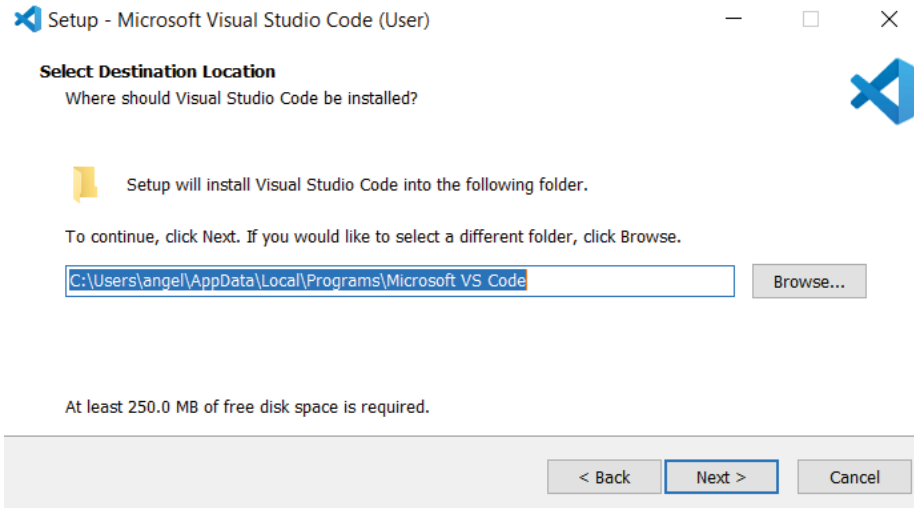


Figure 12.23 – Choosing the location of the install

4. Choose the location of the shortcut or keep the default:

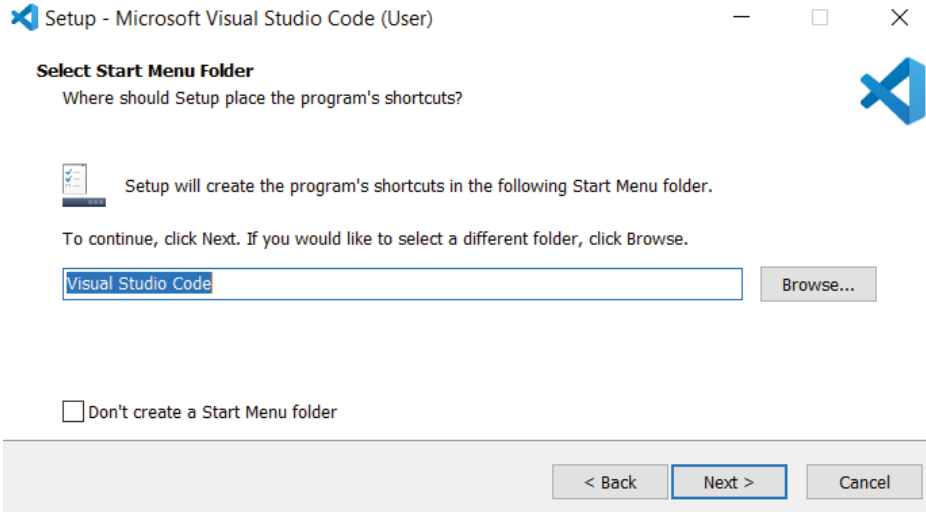


Figure 12.24 – Changing the start menu

5. Select **Install**:

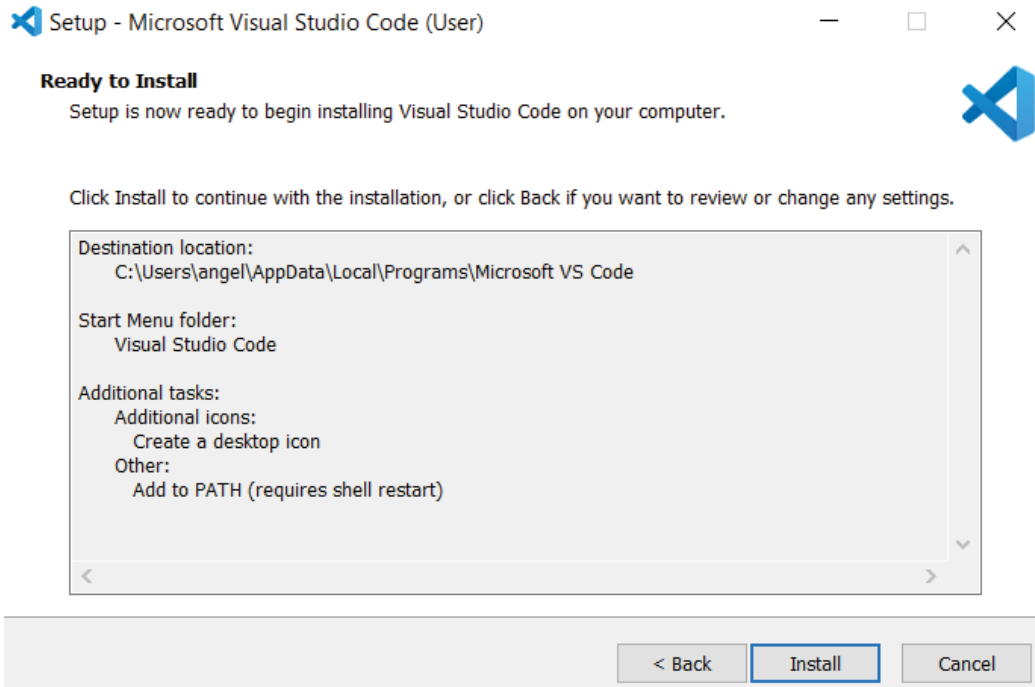


Figure 12.25 – Clicking to install

Visit the following link to learn more about packaging and deploying solutions in Visual Studio:

<https://docs.microsoft.com/en-us/visualstudio/sharepoint/packaging-and-deploying-sharepoint-solutions?view=vs-2019>

Now that we have set up Visual Studio Code, let's look at creating an app catalog within SharePoint to support deploying web parts.

Creating an app catalog

To deploy web parts in SharePoint, you must first create an app catalog site. This is the location where the developed web parts will live. From the app catalog, you can deploy solutions throughout your SharePoint environment. Follow these steps to create an app catalog:

1. Navigate to SharePoint Central Administration.

From the landing page, click on the **Apps** heading and select **Manage App Catalog**:

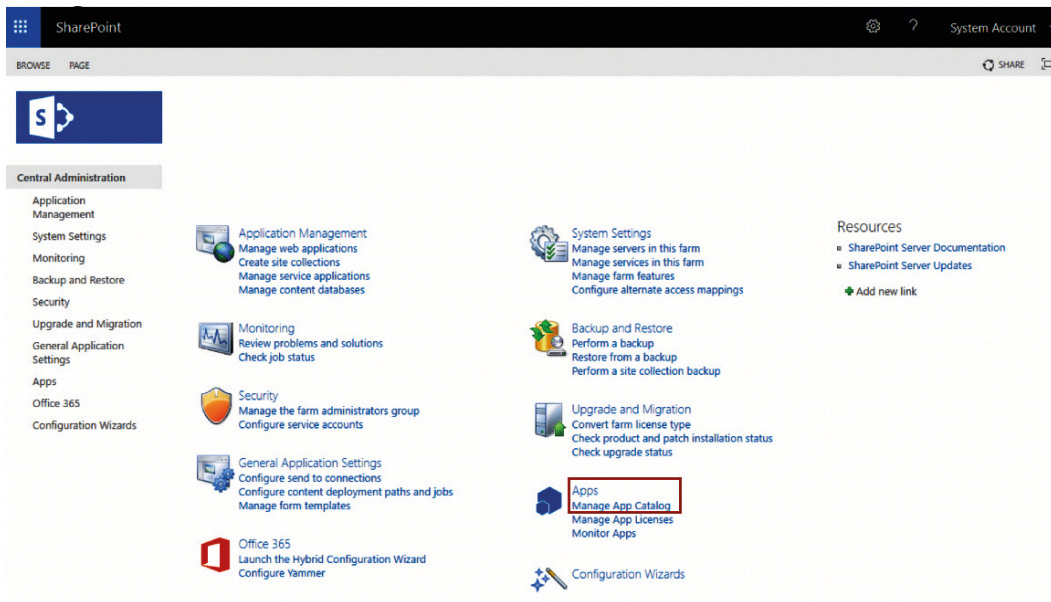


Figure 12.26 – Manage App Catalog

2. Select the web application where you want the app catalog.
3. Select **Create a new app catalog site** and click **OK**:

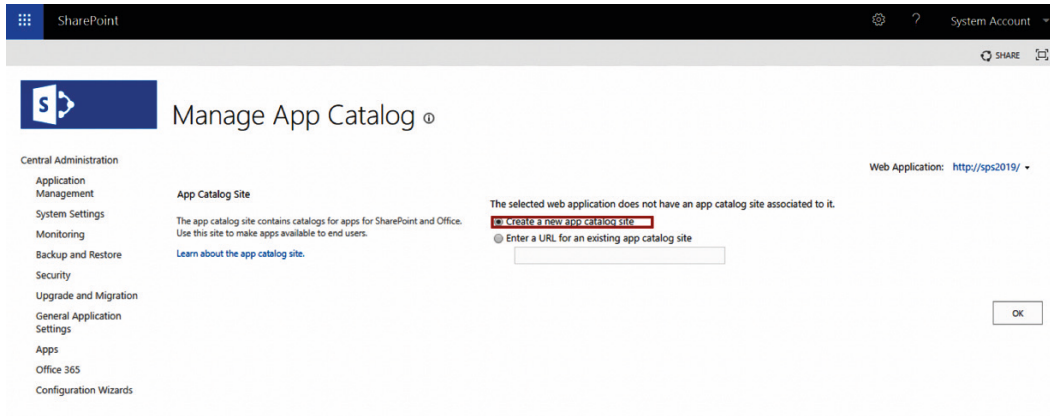


Figure 12.27 – Create a new app catalog

4. Add the details for the app catalog, including **Title**, **URL**, and the site collection admin details, and then click **OK**:

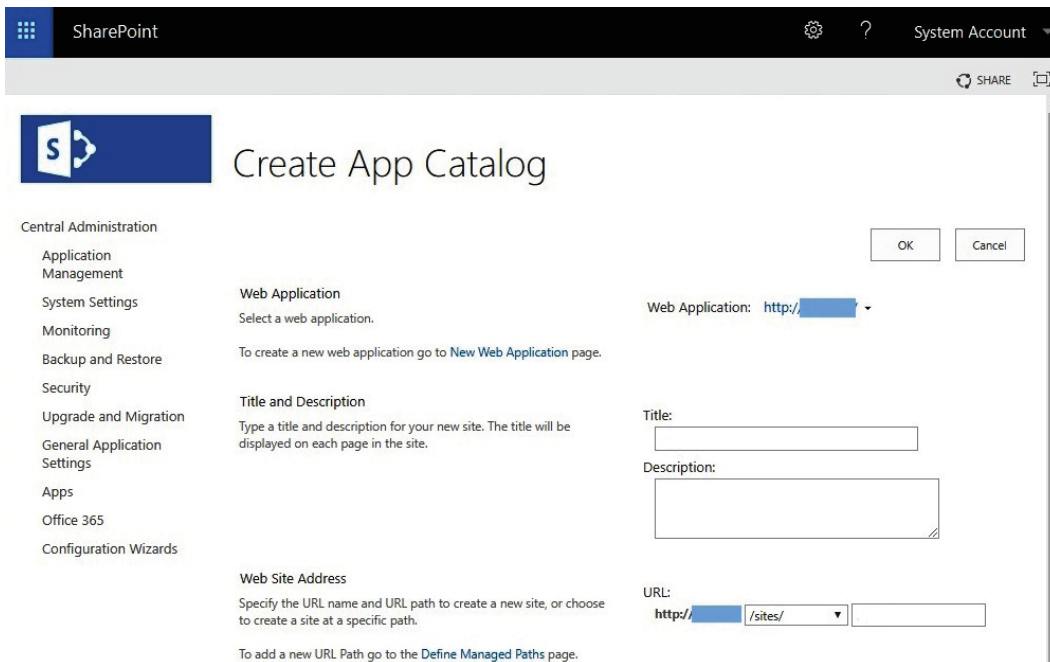


Figure 12.28 – Filling out the site collection details

Note.

The site collection creation may take a few moments. Once it is created, you will be able to install SharePoint framework solutions on the app catalog site.

More prerequisites for SPFx

Yeoman and Gulp are both prerequisites that must be installed for SPFx. Yeoman provides the project templates for your development work and Gulp is the task runner for SPFx.

To install Yeoman and Gulp globally, run the following command:

```
Npm install -g yo gulp
```

In addition to installing Yeoman and Gulp globally, you need to install the Yeoman SharePoint generator. The Yeoman SharePoint generator allows you to create client-side solutions using the correct toolchain and project structure. The generator gives you the common build tools that you will need, as well as the basic code, and supplies the "playground" websites for testing.

To install the Yeoman SharePoint generator, use the following command:

```
Npm i -g @microsoft/generator-sharepoint
```

To call the Yeoman SharePoint generator, use the following command:

```
Yo
```

Additionally, the command line can be used to scaffold projects instead of going through the interface prompts. You can use the following command to return a list of command-line options:

```
yo @microsoft/sharepoint --help
```

To learn more about scaffolding SharePoint development projects using the Yeoman generator, please visit the following link:

<https://docs.microsoft.com/en-us/sharepoint/dev/spfx/toolchain/scaffolding-projects-using-yeoman-sharepoint-generator>

In the next section, let's go over the steps to upgrade an SPFx project to the latest version.

Upgrading existing SharePoint development projects from SPFx version 1.10 to version 1.11

Microsoft recently upgraded SPFx from version 1.10 to version 1.11. If you already have existing development packages created in version 1.10, you can take the following steps to upgrade your package to version 1.11:

1. Navigate to the `package.json` file to locate all of the packages using SPFx version 1.10. You will need to use the package name in the console.
2. To uninstall version 1.10, use the following:

```
npm uninstall @microsoft/{spfx-package-name}@1.10
```

3. To install version 1.11, use the following:

```
npm install @microsoft/{spfx-package-name}@1.11 --save  
--save-exact
```

Make sure that you update the package solution with the developer information. This is a new addition with SPFx and if you do not update this, you will get an error during the Gulp package solution process.

Visit this link to learn more about the process to update the developer info:

<https://docs.microsoft.com/en-us/sharepoint/dev/spfx/toolchain/sharepoint-framework-toolchain>

New features of SPFx version 1.11 are as follows:

- Now supports SharePoint framework solutions via AppSource and Marketplace
- The ability to have your web parts exposed in Teams messages
- Additional developer information metadata fields
- The ability to preview images for a web part

Deprecated features in SPFx version 1.11 are as follows:

- No more support for `system.js` in the local workbench.
- Node.js v8 is no longer supported as discussed earlier; the accepted version is Node.js v10.xx.
- In this new version, Microsoft has removed the Knockout web framework option when creating web parts. Knockout can still be used but the default scaffolding is no longer available.

In the next section, we will discuss the SharePoint Framework toolchain. The vast array of open source development packages available will provide you with a head-start in developing client-side solutions. Be sure to visit the links included in the section to learn more.

The SharePoint Framework toolchain

The SharePoint Framework toolchain is a set of development tools and framework packages that allow the developer to build end-to-end client-side solutions and deploy these projects. Some SharePoint developers may have issues with this new approach to SharePoint development. However, developing via the modern web development toolchain is already very popular throughout the development industry and it is now the way of the future for SharePoint development:

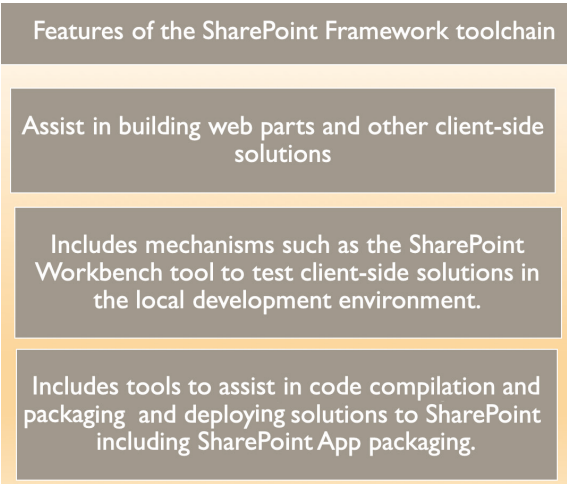


Figure 12.29 – SharePoint Framework features

Node.js changes coming soon

Microsoft now owns NPM, which was the largest software registry in the world. NPM is a package manager for JavaScript. NPM is popular primarily because of the open source Node.js. Microsoft has been betting on open source for the past few years and they have strengthened their position in the open source world by also purchasing GitHub, which is also widely used today. Since the purchase, they plan to integrate NPM with GitHub. Open an account today and get access to learn, see what's trending, access open source guides, and so much more:

<https://github.com/>

In addition to being an open source online repository, NPM is also a command-line utility. You have seen many of the commands run in this chapter start with NPM; this is because NPM commands are used to install packages and manage versions and dependencies. If you run the `npm install` command from the root of your package, it will automatically install the dependencies associated with the package. This saves precious time in the development process and helps to minimize dependency errors in your project.

NPM has a large website that contains open source packages from all over the world and, as mentioned, is also now a part of GitHub. Packages from NPM can be adapted to fit your SPFx projects. The CLI is run from your terminal to interact with NPM. NPM also consists of a large registry of JavaScript and the metadata around it.

Visit the following link for NPM open source packages: <https://www.npmjs.com/>.

Next, we will walk through the steps to build your first client-side SPFx web part.

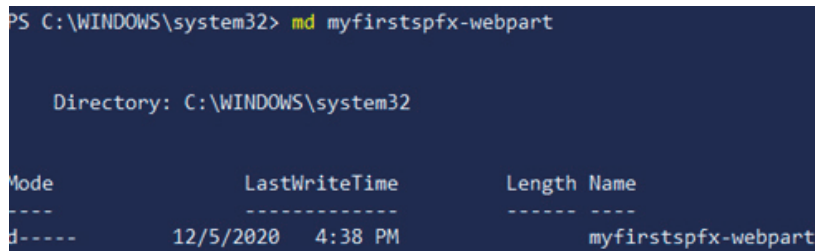
Develop a Client side WebPart

The following steps can be used to create a very simple web part. Of course, the options and complexity of building web parts are endless as your skill set grows. Although, in depth development is beyond the scope of this book, we wanted to show you a quick example to get you started. Follow these steps to begin:

1. From the PowerShell Admin console create a project directory using the following command:

```
Md myfirstspfx-webpart
```

Which results in:



```
PS C:\WINDOWS\system32> md myfirstspfx-webpart

Directory: C:\WINDOWS\system32

Mode                LastWriteTime         Length Name
----                -
d-----          12/5/2020   4:38 PM              myfirstspfx-webpart
```

Figure 12.30: Create the project Directory

2. Navigate to the newly created project directory via Powershell:

```
cd myfirstspfx-webpart
```

Which results in:

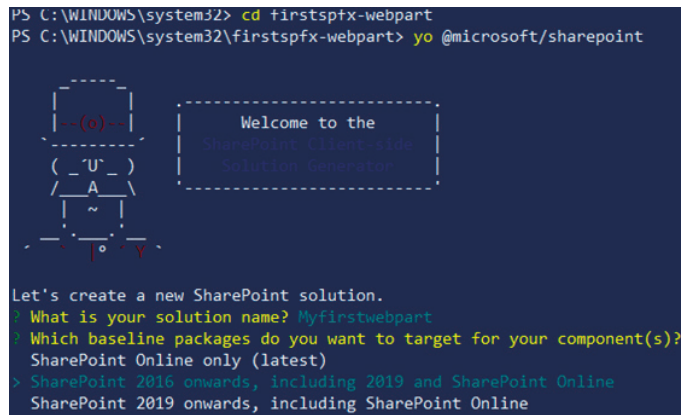
```
PS C:\WINDOWS\system32> cd myfirstspfx-webpart
PS C:\WINDOWS\system32\myfirstspfx-webpart>
```

Figure 12.31: Navigating to the New Directory

3. Run Yeoman SharePoint Generator

```
Yo @microsoft/sharepoint
```

Which gives us the following result:



```
PS C:\WINDOWS\system32> cd firstspfx-webpart
PS C:\WINDOWS\system32\firstspfx-webpart> yo @microsoft/sharepoint

  _ _ _ _ _
  (o)
 _ _ _ _ _
  (U)
  A
  ~
 _ _ _ _ _
 | o |
 _ _ _ _ _

Welcome to the
SharePoint Client-side
Solution Generator

Let's create a new SharePoint solution.
> What is your solution name? Myfirstwebpart
> Which baseline packages do you want to target for your component(s)?
  SharePoint Online only (latest)
> SharePoint 2016 onwards, including 2019 and SharePoint Online
  SharePoint 2019 onwards, including SharePoint Online
```

Figure 12.32: Run Yeoman Generator

Answer the questions about the new webpart, including the solution name, target environment, and whether to allow deployment of this web part to all sites.

4. Once you answer the final question, you will see the creation of the Webpart Scaffolding as shown in the following screen:

```
create package.json
create config\package-solution.json
create config\config.json
create config\serve.json
create tsconfig.json
create .vscode\extensions.json
create .vscode\launch.json
create .vscode\settings.json
create config\copy-assets.json
create config\deploy-azure-storage.json
create config\write-manifests.json
create src\index.ts
create gulpfile.js
create README.md
create tslint.json
create .editorconfig
create .gitignore
create src\webparts\myfirstwebpart\MyfirstwebpartWebPart.module.scss
create src\webparts\myfirstwebpart\MyfirstwebpartWebPart.ts
create src\webparts\myfirstwebpart\loc\en-us.js
create src\webparts\myfirstwebpart\loc\mystrings.d.ts
create src\webparts\myfirstwebpart\MyfirstwebpartWebPart.manifest.json
```

Figure 12.33: Scaffolding

- Once the scaffolding completes, you will see the below message of a successful Web Part creation:

```
added 1861 packages from 1775 contributors and audited 1871 packages in 68.79s

33 packages are looking for funding
  run `npm fund` for details

found 1778 vulnerabilities (1345 low, 34 moderate, 392 high, 7 critical)
  run `npm audit fix` to fix them, or `npm audit` for details

   =+#####
   #####
   #####/  (@)
   ##### \
   #####/ (@)
   #####  /
   #####/ (@)
   #####/ (@)
   #####/
   * =+#####
```

Congratulations!
Solution **myfirstwebpart** is created.
Run **gulp serve** to play with it!

Figure 12.34: Solution Creation Successful

6. Since the client-side toolchain uses the HTTPS endpoint, you must install the developer Trust Certificate by using the following command:

```
gulp trust-dev-cert
```


7. Run the following command to preview and build onto the new webpart:

```
gulp serve
```

8. Your Web part preview will open in SharePoint Workbench.

Now that you have the information you need to set up your development environment and create your first SPFx web part, let us turn our attention to developer best practices so that you can create successful solutions and steer clear of any trouble.

Developer best practices

In this section, we will discuss developer best practices. Regardless of your deployment method or the system you are deploying to, it is important to keep in mind deployment best practices. Following best practices will get you much closer to realizing a successful deployment. Ignoring best practices will most definitely get you in a world of hurt eventually. First of all, every development rollout should have a plan; whether you are following the waterfall method where you follow your plan out from beginning to end or you are utilizing an Agile approach where you roll out shorter iterations and improve as you go, you must document your plan from the beginning all the way through to completion.

Requirement gathering

Requirement gathering can seem like the easy part of the development process – after all, you're only speaking with your customers and figuring out what they want and what they need in the development solution. However, this is the portion of development that can lead to a poor product or an upset customer who thought they were requesting one thing and you deliver another. The best way to avoid this is to make sure that you have the proper stakeholders in the room when you are gathering requirements. Make sure that the decision-makers are in the room and that those decision-makers, once you have gathered the full list of requirements, are willing to sign off on the finalized document.

In the statement of work or whatever agreement document it is that will cover this rollout, make sure that clauses are included to ensure that if requirements are changed by the customer, then the timeline and cost will have to be adjusted to accommodate these changes. The stakeholders need to know this from the beginning before you document the set of requirements. Let them know that changes can occur; however, changes will come at a cost, and that cost may be scrapping the entire development project and starting from the beginning.

Take a look at the following chart for a quick-glance view of some important requirement gathering techniques.

The following list is not an exhaustive list of requirement gathering techniques. However, these are the points that you must remember to cover when gathering requirements from clients. As you begin to gather more requirements for solutions, you can add additional techniques to the following list that have worked well for you:



Figure 12.35 – Requirement gathering techniques

Many stakeholders and project teams will want to have the technical specifications for the development process in place before the actual development begins. This is one of the advantages of the waterfall method because you can build in your planning phase; you can build the creation of all of the technical specifications into the project plan before you ever develop your first piece of code for the project.

However, in the world of SharePoint, many of the stakeholders will not know exactly what they want until they see an actual representation of it. So, of course, if you follow this process and build out the development before your stakeholders get to try it, you risk finding out that what you developed was not what they needed. Communication gaps in development between project teams and stakeholders can often lead us down this road. Once you are so far down this road that the stakeholder can actually test the product that you have developed for them, you may find out that it is not indeed what they wanted and it may be too late – and oftentimes it is.

That is why we highly recommend the Agile approach to development. Agile does not mean development done on the fly; you still need a solid plan that outlines all of the stages. However, the iterative nature of Agile development will allow you to roll out the first stage, have your stakeholders test it and see whether you're going down the right path, and make corrections if necessary before you move on to the next stage. This method of development can lead to a successful deployment without the need for scrapping an entire project that did not meet the customers' needs.

Take a look at the following chart to see the stages of a development cycle.

Whether you are following a waterfall development approach or an Agile approach, the standard stages of development still apply. With an Agile approach, you will cycle through the development stages multiple times:

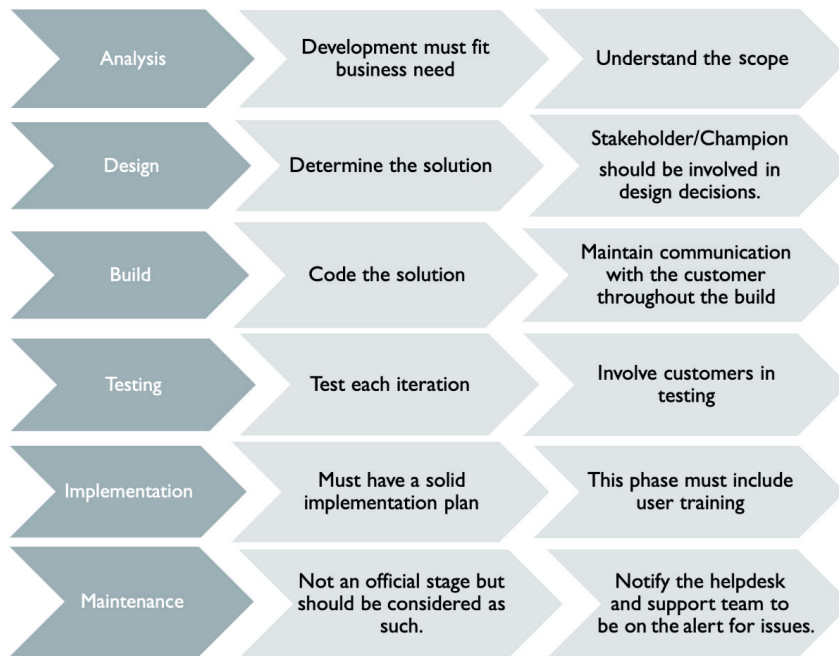


Figure 12.36 – Software development stages

The development cycle is very important to learn. In some organizations, you may see different variations of this or no development process at all. You also want to make sure you follow what works for you within this process to suit the specific processes that you encounter. Make sure you figure out where you can insert your own personal process cycle in there as well. *Figure 12.31* gives you the basics, but remember to always modify it where you have to so that the development cycle works to support successful deployments.

Preproduction environments

The standard preproduction environments that you will be required to stand up and maintain for SharePoint development is the development environment and the **User Acceptance Testing (UAT)** environment. However, the development environment and UAT are the bare minima and these two environments often fail to offer enough testing of the new solution before deployment. It is recommended that in addition to the aforementioned environments, you stand up a **System Integration Testing (SIT)** or performance testing environment and a quality assurance environment:

- **Development environment:** The development environment is usually not an exact replica of the production environment. However, this environment should have all of the necessary elements for the developer to deploy and test the functionality of the newly created solution before deployment to the SIT environment.
- **SIT:** This is an extremely important step to ensure that the newly developed solution will seamlessly integrate into your existing platform. SIT is performed to test that all of the components of the SharePoint system perform to expectations after the deployment of a developed solution to catch any system issues that could occur before the solution is deployed in production. In some organizations, SIT is performed by the administrator of the SharePoint environment; in others, SIT is performed by the quality assurance team.
- **UAT:** UAT may be the most important stage to a successful deployment. Make sure that your UAT environment is in great condition as all of your environments should be. Have patches applied regularly and set up this environment to simulate the production environment as closely as possible. Test scripts should be created for all UATs.

If your organization is small, you may not have a quality assurance team; however, you can include other members of the technical team, including the capacity monitoring team. In most small shops, you would most likely do this testing yourself. This SIT should not be performed by the same person who developed the solution as this can lead to missed issues or reworking of code directly in SIT, which should never happen. The SIT environment should match your production environment. This is very important because if these environments do not match, production issues may not be caught before they reach production.

Most enterprise organizations have a quality assurance team; this team sits apart from your internal IT team and is tasked with rigorously testing solutions before they are deployed into production. Having a quality assurance environment is a bonus as this quality assurance team will maintain access to the environment and can easily test the developed solutions before deployment into production. However, some small companies will not have a separate quality assurance environment but that's OK; the quality assurance team can utilize the UAT environment for their testing.

The success or failure of your deployment depends on having good-quality test scripts that cover all of the functionality expected from the solution. Make sure that you understand how the business will utilize this solution, how they will access this solution, and how they perform their work day to day; these aspects should be covered in the test scripts. When creating test scripts, place yourself in the shoes of the business user and remember to write test scripts to cover the different roles of the users. Testing is an easy place to slack off. Do not get lazy here as it will cost you. Make sure all the functionality has been tested.

Testers

Choosing testers for the developed solution is extremely important. We've already discussed quality assurance performing testing on the solutions that you build; however, quality assurance will be testing the functionality of the solutions and possibly the logistics and ease of use from their perspective. However, members of the quality assurance team are typically very technologically savvy, and this may lead to an ease of use of the product that may not be experienced by the user.

You must have the user community involved in your testing. We caution you not to just hand over the test scripts, go away, and then come back for sign off. Testing your solution is not your users' primary job; they may be busy with other activities and not prioritize fully testing the solution. Users have been known to sign off on solutions that they have not thoroughly tested. This is why it is important to have the stakeholders engaged, as they are actually accountable for the success of this rollout. If the stakeholders are accountable, they are more likely to have a vested interest in the success of the solution. Choose your testers wisely and always get sign off from multiple stakeholders and their management.

Capacity planning

When you are developing and deploying solutions into an on-premises environment, you must consider the performance configuration of the platform before you start development.

Consider jobs running on the servers, search configurations that could drain capacity, and available storage on the platform for logs and data. Many times, developers create solutions in a silo, which can lead to overzealous development that does not take into account the actual limitations of the environment.

For instance, if a large number of users are going to be accessing a developed solution at the same time or the solution will lead to a heavy influx of documents to be stored in SharePoint, as in this example, this must be planned for with the capacity teams. If you are a one-person IT shop, then you must make sure that your environment is configured and revved up to handle the upswing in usage and storage.

List limits

When creating solutions, always keep in mind the SharePoint list limits and be sure that you are not designing a solution that will quickly breach those limitations. Use the following link to learn more about SharePoint limits: <https://docs.microsoft.com/en-us/sharepoint/install/software-boundaries-and-limits-0>.

Timeout issue

If the development solution is meant to ingest large files, you must configure the file upload size limits. Be aware that users can face timeout issues with large file uploads.

SharePoint on-premises is not the best place for extremely large files that eat up tons of storage space. This is where good governance will come into play.

If everyone developing, managing, and using solutions understands the limits, then it will be easier to prevent these types of issues. SharePoint storage is expensive; the use of connectors in your development can help to overcome timeout issues and storage limits. If the organization has access to other storage systems, then connectors can be developed to store the document external to SharePoint while allowing users to view the documents within SharePoint. This is a great method to consider if you run into this sort of issue because it alleviates the large storage expense while still taking advantage of the user interface and features of SharePoint that the users love.

Enterprise security

Begin with enterprise security in mind. You must follow the security standards of your organization. Do not wait until you are halfway through development, or even worse, finished with development and in production, to realize that your application goes against a policy. Make sure that you are familiar with the enterprise security policies before you begin development. It is often a good idea to have a meeting with the enterprise security group in the design phase to get initial approval and check that nothing you are developing is breaking any policies.

Summary

Microsoft has made it clear that the SharePoint development framework is the way of the future. Microsoft over the years has made the steady move from farm solutions to sandbox solutions to app solutions, and this in turn has made developing on the platform less risky and more uniform. Additionally, since SPFx uses common open source client development tools, traditional SharePoint developers who embraced this new way would now not be limited to only developing for SharePoint but could begin developing cross-platform. In the same vein, the agnostic framework has opened up the world of SharePoint development to developers that did not traditionally work in SharePoint. SPFx can be used to develop solutions both on-premises and on SharePoint Online. This standardized development method is great because as many organizations are looking to move their technological footprint from on-premises to the cloud, we must begin to create solutions even while on-premises that will migrate easily when the day comes.

Best practices should always be considered and adhered to when creating solutions. Taking the time to gather clear requirements is extremely important. You must make sure that you are building the solution that the client is expecting. Understanding the client's expectations occurs by listening to your client's needs and understanding the business problem that they need to solve. You need to work with the client throughout the entire development process to be sure that you are on track to providing that solution.

In this book, we tried to cover as much as we could to give you insights on what is new, what has changed, and what tools and knowledge you need to move forward in this new cloud-integrated SharePoint Server 2019 application. There are many people that work in this type of deployment and we hope we have touched on enough topics to give you insight into those teams and responsibilities, and enough technical information to get you moving on your project with confidence. Some of the topics on SharePoint 2019 require deeper knowledge and research, which we pointed out during the course of the book.

There was no way we could add any more to those areas in the book. When talking about technology, there are areas that require another book to learn what those technologies consist of. We recommend researching those areas and learning more about how you can implement SharePoint 2019 effectively from all standpoints. We hope this book has given you a good insight into implementing SharePoint 2019.

Questions

You can find the answers on GitHub under Assessments at <https://github.com/PacktPublishing/Implementing-Microsoft-SharePoint-2019/blob/master/Assessments.docx>

1. In SPFx, Node.js v8.xx is currently supported. True or false?
 - a) True
 - b) False
2. If you are an engineer who can create both frontend and backend fully functional web applications, which of the following do you qualify as?
 - a) DevOps engineer
 - b) Full stack engineer
 - c) Frontend engineer
3. When dealing with client requirements, what is it best practice to do?
 - a) Speak with the client once, midway through development.
 - b) Gather requirements early on and continue to communicate with the client as requirements are refined and throughout the development process.
 - c) Gather all requirements from a junior member of the client staff and never speak to the decision-makers.
4. What is NPM?
 - a) NPM is an open source Node.js software repository.
 - b) NPM is a product owned by IBM and is used to configure Azure.
 - c) NPM is a project management certification.
5. SharePoint PowerShell allows you to manage Office 365 and Azure. True or false?
 - a) True
 - b) False

6. What is the proper order of the development cycle?
 - a) Implementation, analysis, build, testing, design, maintenance
 - b) Analysis, design, testing, build, implementation, testing
 - c) Analysis, design, build, testing, implementation, maintenance
7. SPFx web parts can be used on both classic and modern pages. True or false?
 - a) True
 - b) False

Further reading

For more information on SPFx, check out the following links:

- <https://docs.microsoft.com/en-us/sharepoint/dev/spfx/sharepoint-2019-support>
- <https://docs.microsoft.com/en-us/sharepoint/dev/spfx/sharepoint-framework-overview>
- <https://docs.microsoft.com/en-us/sharepoint/dev/spfx/release-1.11.0>

For more information on the SharePoint client library, check out <https://docs.microsoft.com/en-us/sharepoint/dev/sp-add-ins/complete-basic-operations-using-sharepoint-client-library-code>.

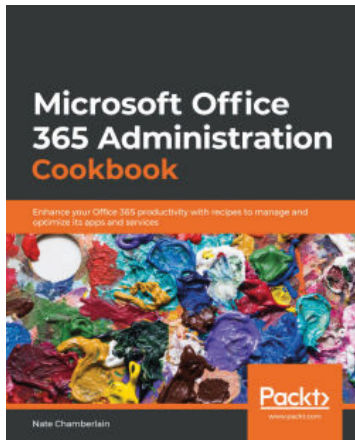
SharePoint code samples: <https://docs.microsoft.com/en-us/sharepoint/dev/general-development/code-samples-for-sharepoint>

SharePoint development center: <https://developer.microsoft.com/en-us/sharepoint>

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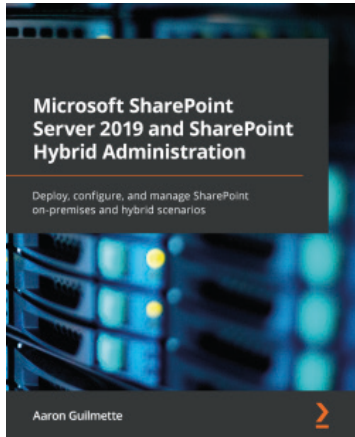


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